DOI: 10.15587/978-617-7319-45-9.CH8

8 GOAL-SETTING IN THE PROCESS OF FORMING THE STATE STRATEGY FOR INNOVATIVE DEVELOPMENT OF TRANSPORT INFRASTRUCTURE

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ABSTRACT

Sections 1 and 5 discussed innovation as a driving force for development in an era of ephemerality and turbulent challenges. The innovative approach is needed in ensuring the quality of education (Sections 1, 3), in enterprise management (Sections 6, 7) and in the process of forming a state infrastructure development strategy. To improve the quality and validity of strategic actions in the process of public management of innovative development of transport infrastructure, elements of the decision support system for the formation and implementation of an innovative strategy for innovative development of transport infrastructure, which include a set of task blocks (goals, project proposals, strategic alternatives, motivation, communication, controlling) and tool modules (data, expert assessment, analytics, modeling), have been identified. It is proposed to ensure compliance of strategic goals of innovative development of transport infrastructure with dynamic changes in the environment of its functioning due to the implementation of the dynamic-adaptive approach to goal- setting in the system of formation of an innovative strategy of transport infrastructure transformation. The latter involves the creation of a reflective information and communication environment for setting and cyclically adjusting goals by involving a wide range of stakeholders, the use of modern information and analytical systems and foresight research technology.

KEYWORDS

Goal setting, innovative development strategies, transport infrastructure, strategic goals, foresight, public administration.

8.1 STRATEGIC TARGET PRIORITIES AND THEIR IMPORTANCE IN THE SYSTEM OF STRATEGIC PUBLIC ADMINISTRATION

Particular importance in the system of strategic public management of innovative development of transport infrastructure belongs to the stage of defining strategic target priorities. This is due to the presence of different views on the strategic goals of innovative development of transport infrastructure, among which the most priority areas and directions should be identified.

Goal setting is traditionally considered in two guises: as a set of actions and as a process [1]. As a process goal setting is a sequence of subsequent stages of analysis and decision-making, the completion of which is a goal.

The analytical stage begins with the collection of information, needed to make future management decisions. The information in this case is used both insider and external.

It should be noted, that there are three categories of goal-setting [2]: given (passive) goal-setting; competitive goal-setting; value goal-setting.

1. Given (passive) goal-setting – the formation of goals based on objective needs or under the pressure of external circumstances. Inside, you can select several sublevels, according to the degree of increasing independence of goal-setting:

a) goal-setting from tasks. This is the simplest level of goal-setting, the continuation of external goals, which is formed directively;

b) goal-setting from needs. Needs exist as an objectively given necessity. Dissatisfaction with needs can lead to cessation of existence. These goals are not subject to subjective choice;

c) goal-setting from threats. This level of goal-setting arises when you need to decide: what to avoid, what to resist? There is already a certain level of independence: threats need to be identified, to determine the probability. Unlike needs, threats do not manifest themselves;

d) goal-setting from problems. It arises because of failures in the implementation of plans. A problem is not obstacles themselves, but the reason why these obstacles cannot be overcome. The main difficulty at this level is to identify the real sources of problems.

2. Competitive goal-setting.

Such goals arise from comparison with other subjects of the market environment. According to their tasks, this level is divided into:

a) goal-setting from the struggle of interests. Key question: How to win? Since the interests of economic entities do not always coincide, the task of this level is to defend their own interests either by coordinating them with others, or by dominating and subordinating others. Goal-setting from the struggle of interests – one of the main levels of goal development to build an effective system of motivation;

b) goal-setting from mutual comparison. In this case, we focus on some target models and focus on success, compared to other businesses. Mutual comparison is one of the strongest motivators of human behavior.

3. Value goal-setting.

There are three directions in this level:

a) goal-setting from VISION. It is the setting of goals based on an image of the desired future, where the key is the image, not a project or plan;

b) goal-setting from values. Goal-setting of this type answers the question: what should we strive for? What is acceptable in the implementation of goals?

c) goal-setting from the mission. This level is based on the questions: what should we do? What is our purpose?

Various features and bases of their classification and structuring are used for systematization of goals.

In management practice, the following types of goals are traditionally distinguished.

By degree of detail: general; private.

By time, allotted for implementation: short-term (less than a year); medium-term (1–5 years); long-term (more than 5 years).

By scale: strategic; tactical; operational.

A strategic goal is characterized (as opposed to a current goal) by the following features [3]:

– future orientation and uncertainty of choice;

– focus on a situation in the environment;

– proactive (precautionary) behavior of all elements-target carriers;

– the relationship with the method of achievement (strategy) and means of achievement (tactics, resources);

– the possibility of alternatives and changes;

– higher level of managerial influence.

Thus, strategic goal-setting will be understood as a multilateral process of defining, formalizing and agreeing on goals according to their qualitative characteristics, as well as modeling and selection of quantitative values to assess the degree of achievement of goals in the long run.

It should be noted, that from the organizational point of view, there are three basic options for goal-setting [2]:

– authoritarian approach («top down»);

– collective approach («bottom up»);

– stakeholder approach, which combines both of the above approaches.

Based on the analysis of the basic aspects of philosophical and methodological analysis of the evolution of goal-setting in management, we can identify the specifics of goal-setting in the context of classical scientific rationality, which is determined by the following characteristics [4]:

– use of positivism as a philosophical basis;

– monopoly of an external observer of the goal-setting process;

– high degree of structure and complexity of a subject of goal-setting (individual, small group, hierarchical structure);

– dominance of the activity approach, with the presentation of a goal as a system-forming factor;

– object-oriented approach;

– wide possibilities of using analytical models (operations research, game theory, etc.) for the formalized description of processes of optimization of achievement of a goal taking into account controlled, uncontrolled and casual factors;

– limited understanding of goal-setting criteria;

– focus on the information approach;

– dominance of monodisciplinarity based on the approach of technical cybernetics;

– ethics of goals, assuming the principle of «the end justifies the means»;

– risk assessment due to the probability of failure to achieve goals.

Generalized goal-setting in the context of classical scientific rationality can be characterized as linear on the basis of hierarchical structures.

Along with this, modern basic trends in the development of scientific rationality, influencing the increasing role of scientific diplomacy in strategic goal-setting are implemented in the following areas [5]:

– increasing the role of the external approach in the development of science and innovation;
– reflexive-active environments as a basic mechanism of innovative development;
– dominance of reflexive activity;
– from the ethics of goals to the ethics of strategic actors;
– from the monodisciplinary to the transdisciplinary approach.

It should be noted, that in our country the most common approaches to strategic management at the state level are directive and/or purely expert principles.

However, at the present stage of management, none of the goals of the state and, accordingly, the innovative development of the transport industry has a real basis for its implementation in the absence of partnerships between the main subjects of goal-setting. This is because the goals of the stakeholders, who will represent a certain type of informal coalition, must be taken into account when setting a goal.

At the same time, there may be certain relations between parties (stakeholders), which are not always cooperative, ie they can be competitive. However, stakeholders can always be considered as a single contradictory whole, the equal interests of the parts of which will determine the trajectory of evolution [6]. Therefore, it is the stakeholder approach that allows a more thorough approach to the goal-setting process, as it takes into account the interests of stakeholders.

8.2 IMPROVING GOAL-SETTING IN THE PROCESS OF FORMING A STRATEGY FOR INNOVATIVE DEVELOPMENT OF TRANSPORT INFRASTRUCTURE

Based on the above, to determine the strategic priorities of long-term innovative development of transport infrastructure, it is necessary to use a mechanism that meets a number of criteria:

– reliance on the opinion of competent specialists in the field of transport;

– the interest of the political leadership and the bureaucracy (it depends on whether the results will be used for political decision-making and strategy development);

– taking into account the interests of a wide range of actors: various political forces, scientific and business communities, civil society and others, not just the opinions of a narrow number of experts and the ruling elite;

– transparency of the process of setting priorities in terms of organizing events, choosing long-term goals, as well as in terms of availability of information about the process for all stakeholders.

It should be noted, that partners in social dialogue cannot act on an equal footing, at least at certain stages the priorities of one over the other are set. At the initial stage, the government often has priority, as it is from it that strategic management and the desire to develop a development strategy come [7]. Prioritizing different groups of stakeholders allows you to determine what they

should pay attention to when developing a strategy. At the same time, as with stakeholders in any organization, stakeholder alliances eventually become part of the strategy.

The degree of influence of stakeholders on strategic change depends on a combination of three components: power, desire to achieve specific goals, political influence on decision-making [8].

Given that the modern world is changing at an exponential rate and new discoveries are taking place every minute, it is very important to follow them because there is a lot of information to perceive, and the growing pace of change requires rapid adaptation and response. In addition, it is possible to fix quantitative target indicators only after forecasting the conditions and opportunities for the development of an object. This issue can be solved by dividing a goal into two stages: the task of a goal function, and the definition of a specific quantitative target level of its value – only after analyzing the possibilities and choosing the best alternative.

In such conditions, it is necessary to move from the static approach to goal-setting to the dynamic-adaptive approach, which involves cyclical adjustment of goals based on the use of modern information and analytical systems and the involvement of a wide range of stakeholders (**Fig. 8.1**).

In the proposed mechanism, the efficiency is provided by the following factors [9]:

1) only a goal function of the controlled system, which is a generalized criterion for the usefulness of the studied system is initially set;

2) an information and communication network of interested persons is formed, which creates an environment of reflection;

3) specific quantitative values of the target level of the utility function and private development goals are determined only after forecasting, analysis of opportunities and selection of the optimal concept.

It is important to emphasize the function of reflection because it contributes to the expansion of consciousness: overcoming stereotypes, building a new understanding, rethinking, etc. It is worth noting, that the filters of reflection determine the coexistence of subjectivity, which allows to ensure the adoption of agreed decisions and the possibility of their further effective implementation.

On the part of an individual subject, the filters of reflection are manifested in the identification of other subjects together with their resources and risks of influences. The reflection filter is a coordinated folding of subjectivity processes. Without this function, it is impossible to ensure parity of subjects, especially in a situation of joint creativity, necessary to cope with the challenges of a turbulent environment, as well as with the states of subjects, which are also parameters of the environment (problems and conflicts).

Modern scientific ideas allow us to establish that the basis of goal-setting is the sources of goals and ways to reflect them. As is well known, the sources of goals are needs, interests, and intentions. Based on this, we can conclude that the strategic goal of innovative development of transport infrastructure reflects the need to move to a qualitatively new state to implement its functions in the context of meeting the interests and needs. In turn, needs should be based on the interests of parties (stakeholders). Currently, the interests and needs of society in the innovative

development of transport infrastructure form the following macro- and megaeconomic requirements for the transport system:

– raising the living standards of the population;

– increasing the value of human capital;

– deepening of interregional demographic disparities;

– mixing of demographic and production load on the natural environment;

– reducing the resource intensity of the economy, improving the processing of raw materials, increasing the share of finished products in the structure of transportation.

Taking into account these factors, the global requirements for promising transport systems are speed, safety, including environmental, energy efficiency, the ability to provide flexible customer service and integration into multimodal transport systems [10].

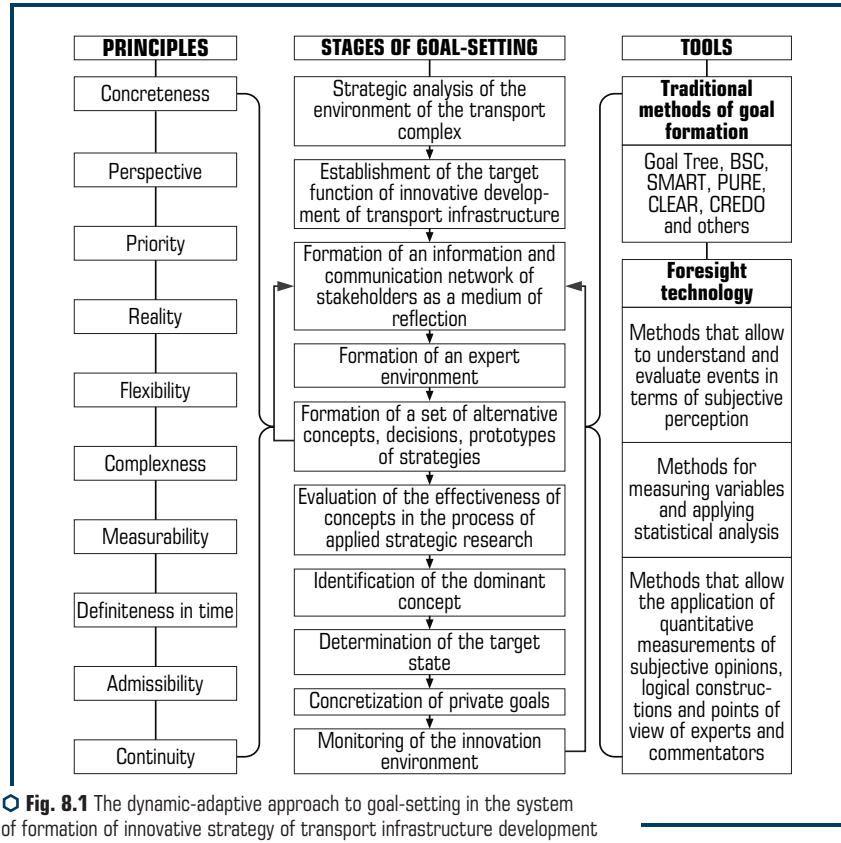

Fig. 8.1 The dynamic-adaptive approach to goal-setting in the system of formation of innovative strategy of transport infrastructure development

** Source: author's development*

It can be concluded, that the innovative development of the domestic transport infrastructure is ensured through the transition of the transport system to a more advanced technological level of freight and passenger transport, which includes competent automation, informatization and electrification of all departments of the transport system in connection «passengers/cargo – management» ensuring the efficiency and safety of transport logistics and the creation of environmentally friendly transport, endowed with the potential to organize high-speed traffic. The main general directions of innovative development of transport infrastructure currently include the following:

– modernization of existing and development of new types and kinds of transport communications (pipelines, roads, railways, tram tracks, etc.);

– modernization of existing and development of new types and kinds of freight and passenger transport equipment;

– modernization, reconstruction of existing and development of new means of communication (for transport);

– modernization, reconstruction of existing and development of new devices in the economy of electrification and energy (for transport);

– modernization and development of new types of track and loading and unloading machines and mechanisms;

– technical re-equipment, reconstruction and strengthening of the existing repair base and development of its new elements and systems;

– creation of a modern system of information support in management.

Identification and further detailing of the goals of innovative development of the domestic transport infrastructure requires the use of special research methods. In particular, the requirement of scientific validity raises the problem of defining quality criteria for goals.

The classical approach [11, 12] to the selection of quality criteria for management goals includes the following requirements.

Scaling goals over time. Carrying out such tactics helps a manager to determine how often it is necessary to conduct inspections, so that in case of deviation from the schedule there was enough time to intensify activities to bring it back to normal. Defining a time frame is important for both long-term and short-term goals.

Concise wording. Most often, this requirement is ignored and the formulation of a goal includes a description of the methods that will be used to achieve this goal, and a number of other «side» information.

A reasonable balance between tension and realistic goals. The practice of management shows that goals that are easily achieved have a weak motivating effect, and this is not satisfying, because people do not put their achievement to their credit. However, there is a «threshold» of complexity of goals, beyond which motivation is also reduced due to the formation of negative expectations of the relationship between the efforts and the results achieved. Studies have repeatedly shown that people work most productively when goals are set at a so-called motivational level – high enough to strive for, but not so high as to fail, and not so low that no effort is required to achieve it. Therefore, the goals must be sufficiently intense, but realistic to achieve.

Flexibility. Goals must be flexible enough to be modified according to the situation in a dynamically changing environment.

Admissibility. Goals are more effective when people are responsible for achieving them, consider them acceptable. This means that the results that performers will achieve must be commensurate with their values and preferences.

Comparability. This criterion presupposes comparability, firstly, between goals of different key spaces, and secondly, between goals of the internal organizational hierarchy, each of which must meet the goal of a higher level.

Measurability. A goal is effective only when it has both qualitative and quantitative expression. Goals that have the qualities, listed above, are more effective than those that do not.

There is a variety of techniques that are aimed at the correct formulation of goals. They partially intersect with each other, but each relates to several different positions, and therefore when choosing a method it is advisable to proceed from the idea of the main goals. A number of techniques not only determine what criteria must meet the goals, but also in what form they can be represented.

Among the methods of goal-setting, the method of American scientists C. Churchman and R. Ackoff, called the «goal tree» [13], has become widely used. It provides for the formulation of goals in the form of a subcontracting hierarchy of tasks of different levels: general; first and second, etc.; sub-goals or intermediate goals; problems that need to be solved to achieve goals; specific tasks that can be set before a performer and their performance can be monitored. All levels are interconnected. The goal tree is usually represented graphically as a pyramid or a branched tree. When compiling the model, it is necessary to follow a strict sequence to create an orderly and visual system.

The method of R. Kaplan and D. Norton [14], which is abbreviated as BSC (balanced scorecard), which translates as a system of goal-setting on balanced indicators, has also proved its effectiveness. The method is that strategic goals are divided into subordinate tasks, expressed in measurable indicators. This is a difficult method to perform, which takes into account not only financial but also other factors: staff, innovative technologies, business processes, work with consumers. The development of the system requires special training, but in most cases this method of goal-setting is highly effective due to the ability to monitor and evaluate the implementation of tasks.

Modern approaches to defining quality criteria for management goals complement the classical approach and clarify some of its provisions. Most methods in their name contain the main criteria that must meet the set goals. The choice of English or other language for the abbreviation is determined by the authors of the method.

The most popular technique is SMART, which is simple and easy to use. The method allows you to formulate goals according to the most important criteria: Specific – accuracy or concretness; Measurable – measurability in specific indicators; Achievable or attractive – achievable and attractive goals; Realistic or relevant – relevance or significance of tasks; Timed-bound – limited in time by specific dates.

The PURE method defines what the goals should be: Positive; Understandable – clear to everyone; Relevant – actual; Ethical – behavioural or moral.

Somewhat different directions are put forward by the CLEAR methodology, according to which the goals should be as follows: Challenge – complex, ie those that challenge others and a team itself; Legal – lawful or valid; Environment – ecological, ie do not pose a threat to the environment; Acceptable – allowable not causing internal rejection; Realistic – reasonable or feasible.

The CREDO method states that the goals should be: C – concrete; R – resulting; E – expressed in units of measurement (monetary, natural, places in a rating); D – doable; O – optimal, limited in time.

The method of publicity is also considered effective, according to which it is necessary:

– openly declare your goals to others;

– to make the list of goals constantly available, ie so that it is constantly in front of the eyes and reminds of itself;

– determine the rewards for achieving the ultimate and intermediate goals.

Such a modern technology as foresight is potentially effective in dynamic-adaptive goal-setting.

Consider several definitions of the term «foresight» [15]:

– systematic joint process of building the future based on strategy and coordination of joint actions (FOREN Guide);

– systematic attempts to look into the future of science, society, economy and technology for the purpose of harmonious development (Asia-Pacific Economic Cooperation-Center for Technology Foresight);

– formalized methodology for assessing the long-term consequences of implemented solutions in the field of science and technology (Technology and Innovation Foresight for Bulgaria and Romania-ForeTech);

– systematic reflection on the future and its impact (Australian Center for Innovation).

The generalization of the above approaches indicates that, in general, foresight (sight in the future) is a methodology for organizing a process, aimed at creating a common vision of the future for its participants.

Foresight allows to develop a scientific idea of the future, taking into account the wishes of society and shows ways to achieve it by supporting innovation and technology, training, required by the economy of a country (region), priority areas of resource use (physical and human capital).

All stakeholders with their current actions seek to support a vision of the future, formed as a result of foresight. This suggests that foresight is a tool for managing technological development, based on the infrastructure, created within it [16]. The basis of foresight is communications of all persons, whose vision affects the future (representatives of ministries and departments, business, science and the public). Thus, the foresight method is a synthetic expert method that combines forecasting with the program-target approach. Foresight is applied every few years and is focused on the long-term and very long-term perspective. Foresight is usually carried out for the long term (20 years), but can be adjusted every 3–4 years. The main resource of foresight is a map of promising areas of innovation and technological development in the sector.

The foresight method is focused on obtaining expert (public or professional groups) assessment of possible scenarios of the state of a research object in the future, and recommendations on pro-

gram steps to achieve the target state of the object («road maps»). Subjects of foresight for the formation of the goals of the strategy of innovative development of transport infrastructure are:

a) government agencies, the purpose of which is to determine the directions of further development and growth;

b) regional authorities that use foresight to restructure and increase the competitiveness of transport infrastructure in the regions;

c) universities, specializing in research in this field and training;

d) industry associations with the necessary analytical qualifications;

e) other institutions.

To participate in foresight must be involved:

a) international and domestic experts in the field of transport;

b) domestic manufacturers, which are leaders in the market of transport engineering;

c) intermediary companies that provide communication with consumers;

d) domestic and international research centers and institutes;

e) educational institutions.

Experience shows that foresight research technology is able to provide solutions to the following problems:

– identification of long-term trends in the development of the transport sector;

– scenario presentation of future changes;

– coordination of development strategies of different hierarchical levels;

– the frequency of updating information and the possibility of using it to adjust policies.

The system of methods, given in table, is used for carrying out a foresight (**Table 8.1**).

Table 8.1 The foresight methods

Methods that allow to understand and evaluate events in terms of subjective perception	Methods for measuring variables and applying statistical analysis	Methods that allow the application of quantitative measurements of subjective opinions, logical constructions and points of view of experts and commentators
Brainstorming Conferences/seminars Expert panels Forecast of genius Interview Literature analysis Goal tree/logic circuits Role-playing, simulation games Scripts/script seminars Sci-fi Simulation games Examination SWOT analysis Weak signals/jokers	Benchmarking Bibliometrics Indicators/analysis of time series Modeling Patent analysis Trend extrapolation/impact analysis	Cross-link analysis/structural analysis Delphi Key/critical technologies Multicriteria analysis Poll/voting Quantitative scenarios Road maps Stakeholder analysis

** Source: generated by the authors based on data from [17–19]*

The following methods are typical for foresight [20]:

– methods of analysis (SWOT and STEEPV analysis became the most widespread);

– methods of forecasting (examination), among which the most common method is Delphi;

– methods of generating ideas (creative), the most famous of which is «brainstorming»;

– methods of interaction (conferences, round tables, role-playing games).

Characteristics of the most used foresight methods are given in **Table 8.2**.

● **Table 8.2** The characteristics of the foresight methods [21–23]

Literature analysis	The method is used to prepare an information base for further analysis procedures. It includes specialized procedures for searching data in various databases and information arrays, as well as the initial preparation of results: comparison, verification, classification, etc
System analysis	A set of methodological tools, used to prepare and justify decisions on complex objects of study, involving their consideration as systems
SWOT-analysis	It is used to identify the strengths and weaknesses of the study area, as well as to identify «windows of opportunity» and threats. The advantage of this method is the possibility of its implementation by a small number of experts
STEEPV-analysis	One of the most popular matrix methods of analysis of factors, influencing the object of study. In it, factors are divided into 6 categories: social, technological, economic, environmental, political, value. To build a sound forecast of the dynamics of the external environment of the subject area as an object of study, possible combinations of these factors are considered and the strength and direction of their influence are analyzed in different combinations
Expert panels	Represent permanent groups of highly qualified experts with well-established communication channels
Simulated expert discussions	This method allows for a comprehensive discussion of various issues, agree on different expert points of view and develop a common solution
Expert interviews and surveys	The application of these methods is aimed at obtaining additional information and clarifying the existing information, required for the implementation of this project
Script analysis	Includes creating pictures of a possible future based on a creative combination of statistical information, facts and hypotheses

However, the specificity of foresight is not only in private methods, but in the methodology as a whole, which can lead to the correct result. Forsight technology methods are carried out in stages. There are 3 such stages, the scheme of implementation of which is given in **Fig. 8.2**:

1. Pre-forsight. At this stage, organizers of the foresight process, stakeholders – and consumers of its end result, form goals and objectives, sources of funding for technology. Pre-foresight differs in the implementation of the characteristics of study conditions, analysis of the internal and external environment for the goals of innovative development of the transport complex, the installation of foresight indicators.

2. Foresight. This stage is characterized by the combined activities of organizational institutions, experts, engaged in work in the field of innovative development of transport infrastructure;

it also explores development prospects, highlights competitive advantages, prepares all necessary intermediate and final documents, conducts seminars and discussions.

3. Post-forsight. At this stage, possible changes in the future are monitored, the implementation of elaborated scenarios of the process development and repeated stages of the study are monitored.

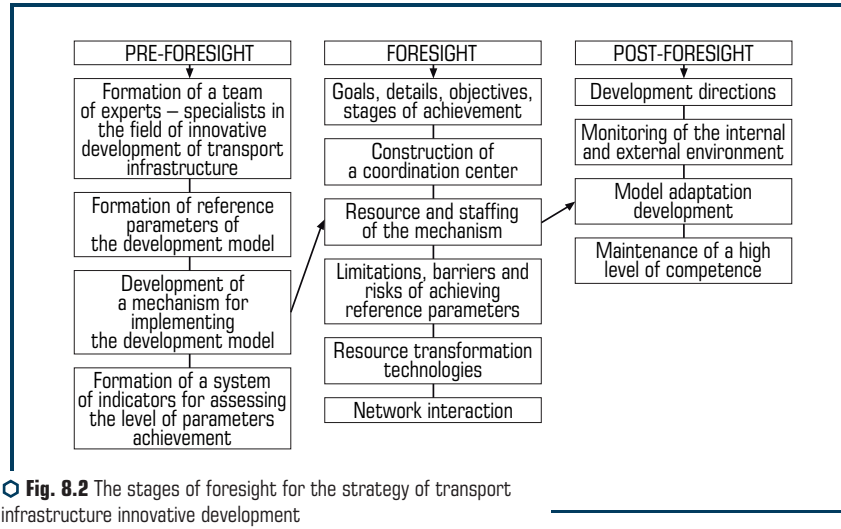

Fig. 8.2 The stages of foresight for the strategy of transport infrastructure innovative development

** Source: generated by the authors based on data from [24, 25]*

The initial stage of foresight (pre-forsight) has a special meaning as it sets the full potential for further work. The implementation of a foresight begins with a number of survey activities (including discussions), which involve representatives of government,expert community, business, science, education, non-governmental organizations, media and others. At the same time, face-to-face activities are often supplemented by conducting large-scale surveys, in which up to 10,000 respondents can participate. During the meetings, participants formulate and analyze alternative scenarios for future transport development, and then collectively choose the best option.

Participants then proceed to prepare recommendations for decision-makers in political, commercial, research and community structures. Based on the established practice, this often involves the selection of priority areas of activity and the formulation of a model plan for the phased implementation of the best scenario of the future (for example, in the form of a «road map»).

The formation of a road map is based on the analysis of existing world trends, domestic experience and taking into account the results of previous projects, implemented in different countries. At the same time, brainstorming is actively used in the work of groups, which is an operative method of solving problems on the basis of stimulating creative activity, where participants are invited to express as many solutions as possible, including the most fantastic ones. In the future, from the total

number of ideas expressed, the most successful ones are selected, which can be used in practice. The success of brainstorming largely depends on the stage of generating ideas, where it is important to exclude any criticism of the views expressed, as the assessment distracts from the main task and knocks down the creative mood. The number of topics at this stage is unlimited. To work, experts must be provided with the latest analytical and information materials and developments.

The formation of expert networks for the survey should be carried out on the basis of nomination, ie each expert of a working group recommends well-known experts and stakeholders in each area, each named recommends known to him/her, etc. However, expert networks unite not all interested, but only those professionals who already have unique competencies in their field. Moreover, members of expert networks must regularly confirm their competencies, including new, acquired knowledge and experience. To some extent (from the point of view of regular confirmation of qualifications) scientific communities are similar to expert networks, but science does not use the competency-based approach to ranking (scientometric indices are not divided by competencies), and the work of scientists is not related to the community as a whole. Both scientists and practitioners take part in expert networks, because expert activity, although built on the scientific basis, but, above all, involves personal experience and knowledge of an expert. Competency classifiers (models) are metrics of expert networks, thanks to which each expert has his/her own unique range of competencies. The uniqueness of an expert is a prerequisite for participation in expert networks, as it avoids competition – each expert is unique. However, within one competence, competition is not only possible but also necessary, as only a comparison can determine the level of competence of a specialist. The latter condition formulates a restriction on an expert network – if the number of professionals with specific competence is small (for example, less than four), it is assumed, that such competence in the network community simply does not exist. An expert network should involve its members in regular activities – at least in summarizing information.

Due to the large number of experts, it is extremely important to organize the form of their work, based on the need to ensure its anonymity and convenience. To do this, you should organize the work so that experts can ask for the necessary clarifications (fax, telephone, e-mail, various Internet protocols).

In parallel, a bibliometric analysis of the state of technology is conducted. This analysis will identify the most trends, as well as the degree of activity and productivity of basic and applied research, their contribution to the development of scientific knowledge. The bibliometric approach to the study of science involves the quantification of documentary information flows, as reliance in these studies is based on quantitative indicators, presented in various bibliographic databases that reflect the state of science as a whole or its individual branches. The objects of study in the bibliometric analysis of science are publications, grouped by different characteristics: authors, journals, thematic sections, countries, etc. The main advantage of this analysis in comparison with other methods, used in foresight, is that the studied phenomena are of an objective nature (published, cited).

Then there is a comparison of the results of expert groups and bibliographic analysis. At this stage, working groups supplement the missing topics based on the results of citation indices. The obtained results are processed – they are divided into areas and further filtered, based on the

specified conditions for conducting foresight research by the scientific council. After that, they begin to compose questionnaires. Lists of specially organized and formed questions are one of the universal ways to obtain the knowledge of specialists for use in monitoring or observation, preparation and decision-making, for forecasting tasks. Questions should be focused on one problem or topic, should be short and clear. All respondents should understand the question in the same way and answer the same question, rather than their options for guessing it. In addition, the list of topics should be open so that experts can make suggestions on the composition of the topics. The questions should be formulated in a neutral tone without any positive or negative assessment of the problem, should not persuade a respondent to give an answer, desired by a researcher. The questions should be presented in a certain logical sequence. First, you should ask questions that can be used to determine the level of competence of respondents in the field of the study (depth of knowledge and degree of involvement in this area).

After the questionnaires are formulated and the composition of experts is approved, a two-round Delphi survey is conducted. After the first round, the obtained data are processed for further acquaintance of experts with the results of the first round. It should be borne in mind, that this method is very tedious for people who participate in it, so an excess of information can negatively affect the number of participants in the second round. Therefore, the obtained data should be presented in a compact, accessible to experts form as structured texts, diagrams, tables, graphs, with emphasis on controversial, extreme, difficult moments. All topics should be ranked in order of importance. The list of questions, criteria and evaluation scales can be adjusted as needed. Thus, in the second round of the survey, experts are offered updated questionnaires and information on the results of the first round. The two-round nature of predictive expert research provides feedback. Experts get acquainted with the results of the previous round: the general group assessment, judgments and arguments of other members of the study. As a result, in the second round, experts, working with updated information, begin to adjust their opinion, increasing the overall consistency in the group, or confirm their previous assessment, having more reason to do so. It should be noted, that those who did not answer the questions in the first round are excluded from the list of experts, participating in the second round. After the second round, the obtained survey data is re-processed. These results are ranked according to the selected priorities and are final.

At the next sub-stage, the data, obtained from the Delphi survey, are subjected to scenario analysis. At this stage, the expert group that worked on the topics, approves two people in each direction to develop a scenario vision of the future based on research (analysis of trends in the modern world based on the main influencing factors (drivers): political, economic, sociological, technological, environmental, demographic, etc.). The interaction of «drivers» creates the dynamics of scenario development. The analysis should identify the most likely events and trends that will later form the basis of the scenarios. Thus, it is necessary to use not classical discrete staging but continuous as a method. In the discrete method, the number of scenarios is small, they are all prescribed, one of them is chosen as the base, the others are considered as undesirable alternatives. You can't drop anything from the selected scenario, you can't add anything to it from other ones.

Continuous staging is based on the concept of «inevitable future», which is determined by decisions, made earlier before staging and the inertia of large systems. This method is based on the fact that a future that is incompatible with the «inevitable» is impossible, and in turn, any future that includes a completely «inevitable future» and does not contain any element of the «impossible future» is a version of the future scenario.

Once the scenarios are written, they are discussed by the group of experts about their likelihood and the risks, associated with using each one. As a result, the most probable development scenarios are selected that are most suitable for modern conditions. Then, based on the data of Delphi analysis and scenario analysis, a draft long-term forecast is prepared. Thus, the implementation of such a structure for the formation of goals of innovative development of transport infrastructure will organize a process, aimed at creating a common vision of the future for participants, which all stakeholders seek to support in their current actions. This methodology will allow not so much to predict the future, but rather to shape it, which will allow foresight to be considered a specific tool for goal-setting in the system of state strategic management of innovative development of transport infrastructure.

It is worth noting, that a truly effective foresight depends on such factors:

1. Creation in the process of foresight of a permanent infrastructure for obtaining, processing, analysis and dissemination of relevant information. This includes specialized centers for tracking and collecting new data on innovative transport development, publicly available Internet resources (such as information repositories and online platforms for maintaining contacts between actors), as well as analytic centers (thinktanks), which along with research can train participants in foresight techniques and provide them with consulting and organizational support in the implementation of multilateral projects. The existence of such an infrastructure in automatic mode provides foresight projects with relevant input data, expert competences (expertise) and channels for interaction between participants. In fact, the elements of the foresight research system are beginning to be institutionalized.

2. Implementation of measures to strengthen trust between foresight participants: the state, business, scientific community and other participants. The presence of trust contributes to the formation of alliances of participants for joint activities, as well as the integration of material results of a foresight into the decision-making system due to the fact that decision-makers begin to take the conclusions of foresight participants seriously and consider their recommendations reasonable.

The effect of these factors can significantly reduce the level of transaction costs within the system itself, and thus make the interaction of participants in the system of innovative development of transport infrastructure more effective and less resource-intensive.

The results of the study allowed us to draw a conclusion about the strategic priorities in the system of state regulation of innovative development of international transport and logistics infrastructure, which include such target characteristics as:

– integration into the world transport system and ensuring stable competitive positions in the world transport market;

– modernization of the existing and development of a new transport and logistics infrastructure of international importance;

– improving the quality of transport and logistics services, as well as ensuring the commercial, socio-environmental and budgetary efficiency of the transport and logistics infrastructure of Ukraine of international importance.

To achieve these goals, two dominant areas of improving the model of institutional support for innovative development of international transport and logistics infrastructure in Ukraine, including motivational and the formation of a digital environment for digital transport corridors, have been established.

The priority instruments of the institutional mechanism for each direction are revealed in **Fig. 8.3** on such components as normative-legal, financial-investment, taxation system, organizational.

The following priority development tools have been substantiated for the formation of an effective motivational state policy of innovative development of the international transport and logistics infrastructure of Ukraine:

1) adaptation of the domestic legal framework and existing institutions to international requirements and standards, strengthening the protection of intellectual property rights and international cooperation in science and technology;

2) increase in investments in the development of transport infrastructure (provision of subventions for the development of transport infrastructure; support for innovation and investment projects; formation of appropriate investment funds; activation of extra-budgetary sources of innovation support);

3) change in the system of taxation of innovation activities and customs procedures through the introduction of various benefits and reorientation to environmental taxes;

4) promoting the initiation of innovations in transport infrastructure (formation of an effective system of interaction between transport infrastructure and the scientific and educational sector, formalization of the state cluster organizational and logistics policy, development of social infrastructure).

The institutional mechanism for the formation of the digital environment includes the development and implementation of such tools of state regulation as:

1) regulations, aimed at removing barriers to digital transformation (including related to the identification of legal entities in the digital environment, electronic document management, data circulation, regulation of artificial intelligence and robotics, information security, installation of special legal regimes, e-commerce), as well as the development and adoption of standards for ecosystems of digital transport corridors;

2) crowdfunding, digital financial assets;

3) tax preferences for manufacturers of digital equipment for software developers, special tax regimes for developers of digital innovations, changes in corporate taxation in the direction of taxes on digital services;

4) formation of virtual structures of state regulation and virtual subjects of infrastructure, generation of professional competencies and diffusion of knowledge of digital transformation.

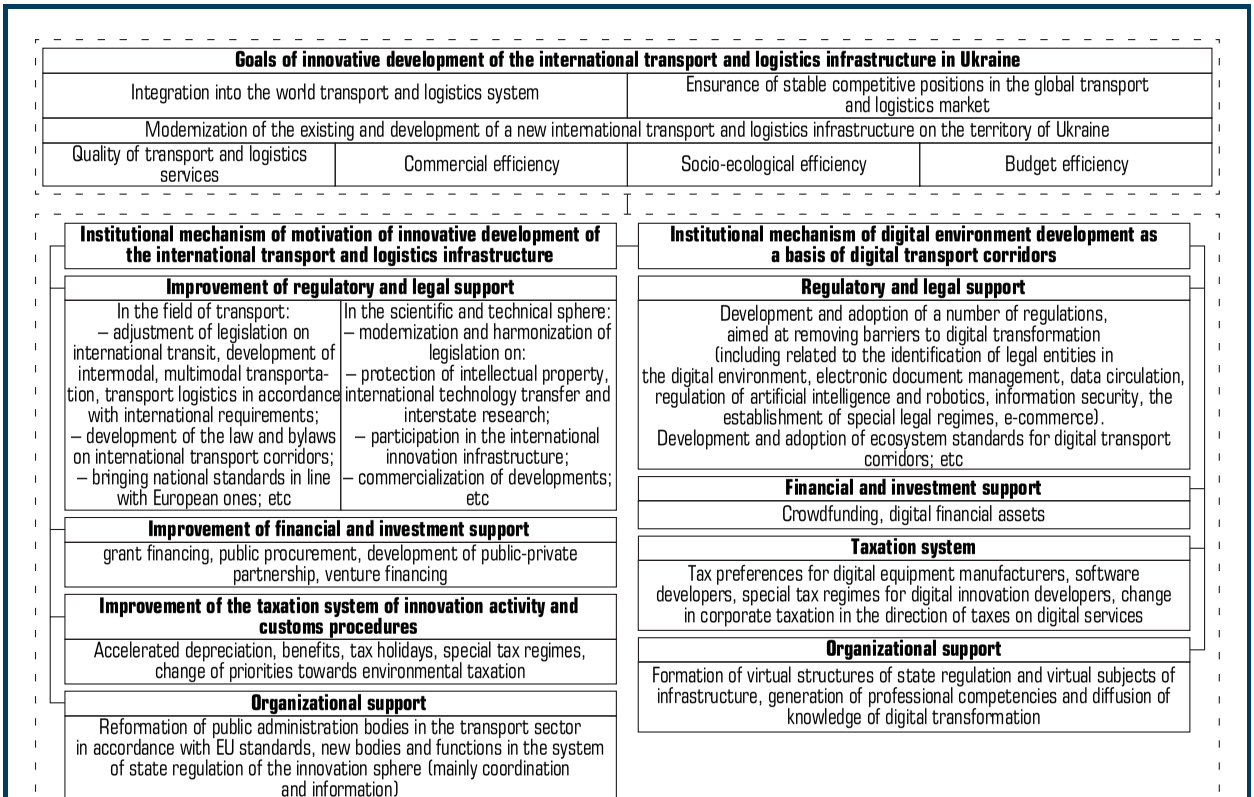

Fig. 8.3 The model of institutional support for innovative development of the transport and logistics system of Ukraine

Thus, it is necessary to focus not so much on the external, secondary manifestations of foresight, but on the internal mechanisms of interaction between its participants to create a transparent and information-rich environment for joint purposeful activities. With this in mind, foresight, or rather interest in its effectiveness, becomes an impetus to close the «gaps» in the information and institutional infrastructure of the system, as well as to create a common atmosphere of trust between key players. In other words, foresight begins to perform the function of increasing the level of self-organization in a complex system of actors and ensuring their interactions. Under such conditions, the purpose of foresight is not to predict the future, but to identify the framework conditions, under which participants and the system itself will be able to painlessly adapt to different development scenarios.

The comprehensive model of institutional support for the innovative development of international transport and logistics infrastructure in Ukraine, which combines the subsystem of motivation for innovation and the formation of a digital environment, is proposed. However, the research can be enhanced by the implementation of corporate social responsibility programs, which on the one hand is an innovative component of Ukrainian realities, and on the other – an integral part of it. The next section of this work will be devoted to the solution of this problem.

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