Chapter 2
Integrated Framework for Evaluation of National Foresight Studies

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2.1 Introduction

The number of Foresight projects has increased significantly over the past few years, growing twofold from 2005 to 2009 (Popper 2009); as a result, the evaluation of such Foresight studies has become increasingly important. The monitoring and identification of probable mistakes occuring through Foresight design and implementation are therefore crucial: strong evaluation procedures are necessary for the success of Foresight, and according to Georghiou there are "three basic tests for Foresight evaluation: accountability, justification and learning" (Georghiou 2003).

Issues concerning the evaluation of Foresight studies have formed a separate field of research. The most widespread problems investigated in this regard are the following: factors of Foresight success, areas of Foresight impact, and evaluation of different aspects of the Foresight process.

Scholars presenting the first research area focus on defining Foresight success and identifying factors that lead to such success. Foresight is considered to be successful if it provides more effective learning and more creativity in developing strategies and initiatives (Bezold 2010). Several factors of Foresight success have been determined: strong interconnections between public, private, and academic sectors; inclusion of different stakeholders; links to the current policy agenda; development of novel methodologies, creativity and lateral thinking; proactive public work; and taking previous experience into account (Calof and Smith 2008; Meissner and Cervantes 2008; Habegger 2010).

The impact of Foresight activities, being the main reason for Foresight intervention, is a principal indicator of evaluation as well. Four types of Foresight impacts – including awareness raising, informing, enabling, and influencing – form a Foresight

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impact schema (Johnston 2012). For the purpose of impact evaluation, researchers have determined several areas of the most considerable Foresight influence. These areas include: knowledge society emergence; science, technology, and innovation (STI) system; business; policy-making, and decision-making processes; and public understanding of science and technology (e.g. Popper et al. 2010; Havas et al. 2010; Rollwagen et al. 2008). Some scholars suggest analysing internal criteria (such as those related to actors, processes, objectives, and inputs/outputs), as well as wider environmental factors, and external factors for the purpose of a qualitative evaluation of Foresight impact (Amanatidou and Guy 2008). In accordance with the close interconnection between STI system and Foresight, the impact of the latter is assessed from the national innovation performance perspective (Meissner and Cervantes 2008).

Issues devoted to the evaluation process include choosing optimal methods and criteria, identifying evaluation topics, and elaborating evaluation algorithm. The following criteria are considered to be the most important: appropriateness, efficiency (input–output, input-effects, and input-impact relations), effectiveness (objectives-output, objectives-results, and objectives-impact relations), sufficiency, value added, usefulness, importance, and relevance (Georghiou et al. 2004a; Georghiou and Keenan 2006; Meissner and Cervantes 2008; Popper et al. 2010; Destatte 2007; Dursun et al. 2011; Rijkens-Klomp and van der Duin 2011). The most "economic" criterion – value for money – is assessed through the evaluation of the funding mechanisms' performance and is characterised mainly in qualitative terms (Popper et al. 2010). The specificity of the "behavioural additionality"[1] criterion is widely investigated by researchers in regard to the evaluation of Foresight impact. Many other criteria can be applied for the evaluation of different aspects of the Foresight process, such as the appropriateness of objectives and the experience of the project team (e.g. Georghiou et al. 2004a; Yoda 2011; Calof 2011).

A review of the literature has revealed that there is no consensus among scholars about Foresight evaluation frameworks. Georghiou and Keenan (2006) argue that an evaluation framework should depend on the rationale for the specific Foresight study (the authors identify three main rationales for Foresight: providing policy advice, building advocacy coalitions, and providing social forums). Other researchers propose that evaluation should be based on normative, strategic, and operational levels of management, as well as three basic elements: people, system, and organization[2] (Alsan and Öner 2004).

Foresight evaluation theory has developed in parallel with the formation of practical Foresight appraisal. The first evaluation initiatives appeared in the late 1990s. Nowadays a great number of Foresight evaluation projects are being implemented. Large-scale national programmes are assessed, as well as separate elements of Foresight studies. Evaluation procedures are conducted through all stages of the Foresight process (ex post, ex ante, mid-term, ongoing evaluation); external and internal experts can be engaged. The chronology and classification

[1] Behavioural additionality is the difference in actors' behaviour resulting from the Foresight intervention (Georghiou et al. 2004b).

[2] It is a framework of the adjusted integrated Foresight management model.

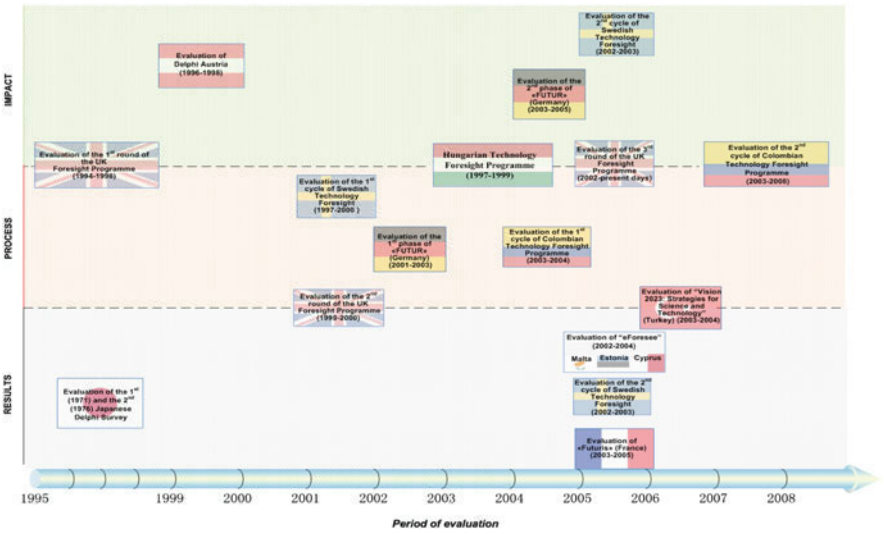

Fig. 2.1 Foresight evaluation projects: chronology and focus of analysis

according to the focus of analysis of the most remarkable Foresight evaluation projects are presented below (Fig. 2.1).

For the majority of projects presented in Fig. 2.1, the period of time between Foresight implementation and evaluation usually doesn't exceed a year. Moreover, in many cases the evaluation procedures are realised during the Foresight, which allows correct decisions to be made with regard to the following stage (e.g. FUTUR and the first round of the UK Foresight) or project (e.g. Hungarian programme).

International expert panels were formed to conduct evaluation procedures in the majority of the cases. Evaluation projects were sometimes initiated by the responsible ministry or department (e.g. Delphi Austria and the second round of the UK Foresight), as well as by members of the Foresight programme's team (e.g. "eForesee"). The results of evaluation projects have a significant importance for a wide range of stakeholders from different levels of management all over the world. Notwithstanding increasing activity in the sphere of Foresight evaluation, only individual examples of methodology for appraisal have been constructed by scholars and implemented during projects (e.g. Alsan and Öner 2004; Popper et al. 2010; Georghiou et al. 2006). The lack of a commonly applied framework impedes the development of Foresight evaluation theory and decreases the effectiveness of practical procedures. Moreover, it limits the possibilities for spreading the experience of successful evaluation.

The intent of this research therefore is to form a framework for the development of a complex national Foresight evaluation methodology. It includes identifying the key criteria and the main stages of the evaluation process on the basis of analysis and systematisation of accumulated practical and theoretical experience.

2.2 Case Studies

Five projects[3] devoted to the evaluation of national Foresight studies were selected for analysis: "FUTUR" (the first phase), the Hungarian Technology Foresight Programme (TEP), the United Kingdom Foresight Programme (the third round), the Vision 2023 Technology Foresight (Turkey) and the Colombian Technology Foresight Programme (the second cycle). Brief characteristics of Foresight programmes and evaluation projects are presented below.

FUTUR

"FUTUR" was initiated by the German Federal Ministry of Education and Research[4] (BMBF) in order to identify the future directions of science and technology development, as well as priority areas for R&D funding (Cuhls 2003; Giesecke 2008). As a result of the programme implementation, several Lead Visions were developed. They have included a description of the examined topic[5] and its significance for society and the economy, scenario, as well as lists of future research priorities (BMBF 2002). An evaluation of "FUTUR" was conducted in 2002 in order to answer the following questions:

- Were the project's objectives rational and were they achieved?
- Was the Foresight project as a whole, as well as particular steps, appropriate for achieving the objectives?
- What could be improved?
- Were the methods applied effective and efficient with regard to the objectives? (Cuhls and Georghiou 2004)

This evaluation initiative was quite unique, especially in its methodology, which used hypotheses. For instance, for the purpose of evaluating the methodology, the following hypothesis was formulated: "mass events such as open-space conferences are a suitable method for structuring foresight" (Cuhls and Georghiou 2004). The results of the evaluation procedures concluded that the Programme was successful, but, that it could have been less complicated and more open. This, in turn, would have guaranteed a decrease in costs and a shorter period of realisation. The main elements of the evaluation process are presented in Fig. 2.2.

[3] The main reasons for that choice were the success of the evaluation procedures and the openness of information. The latter is a crucial requirement: evaluation results are sometimes classified. For example, evaluation reports on "FUTUR" and "Vision 2023" were not published, although the sufficient minimum of information was presented in several papers (e.g. Cuhls and Georghiou 2004; Dursun et al. 2011).

[4] Bundesministerium für Bildung und Forschung, BMBF.

[5] For main themes were analysed: Create Open Access to Tomorrow's World of Learning, Living in the Networked World: Individual and Secure, Healthy and Vital throughout Life through Prevention, Understanding Thought Processes (Cuhls and Georghiou 2004).

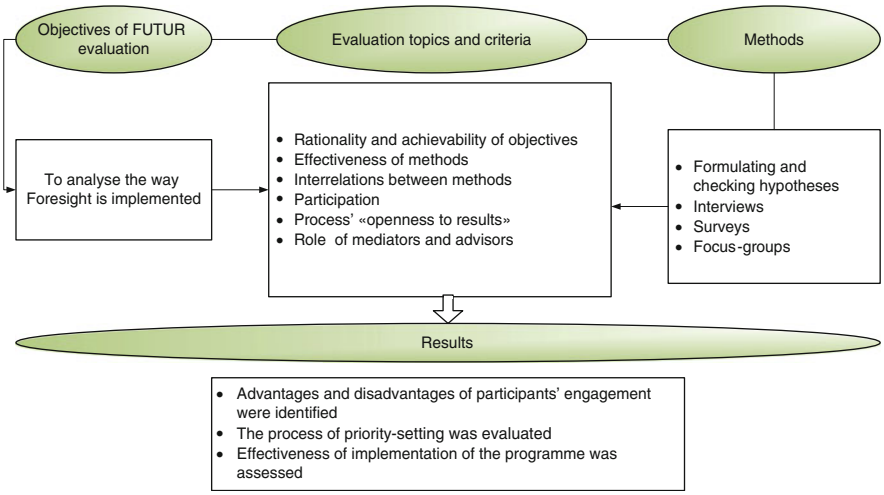

Fig. 2.2 The main elements of FUTUR evaluation

2.2.1 Hungarian Technology Foresight Programme (TEP)

TEP was launched by the Hungarian National Committee for Technological Development. It was the first Foresight programme completed in a Central and Eastern European country. The key objective of the Programme was to identify long-term R&D priorities that would guarantee an effective "catching-up" strategy (Kováts et al. 2000; Rader 2003). According to the findings of TEP, Hungary needs to develop human resources, provide a clean environment, and form an effective national innovation system (Kováts et al. 2000).

TEP became subject to evaluation in 2001–2002. Evaluation procedures were aimed at analysing the level at which the Programme's objectives were achieved and at consulting the decision-making about the future of Foresight in Hungary. Experts' attention was paid to value for money, and obstacles of implementing TEP's recommendations (Georghiou and Keenan 2006). A brief outline of the evaluation framework is illustrated in Fig. 2.3.

2.2.2 United Kingdom Foresight Programme

The United Kingdom Foresight Programme was conducted by the Office of Science and Technology (OST). The main distinction of the third cycle of the Programme was the shift from sectoral and thematic panels to a project-oriented structure (Miles 2003). The mission of the projects realised through the Programme were to identify future challenges and opportunities in science and technology in the

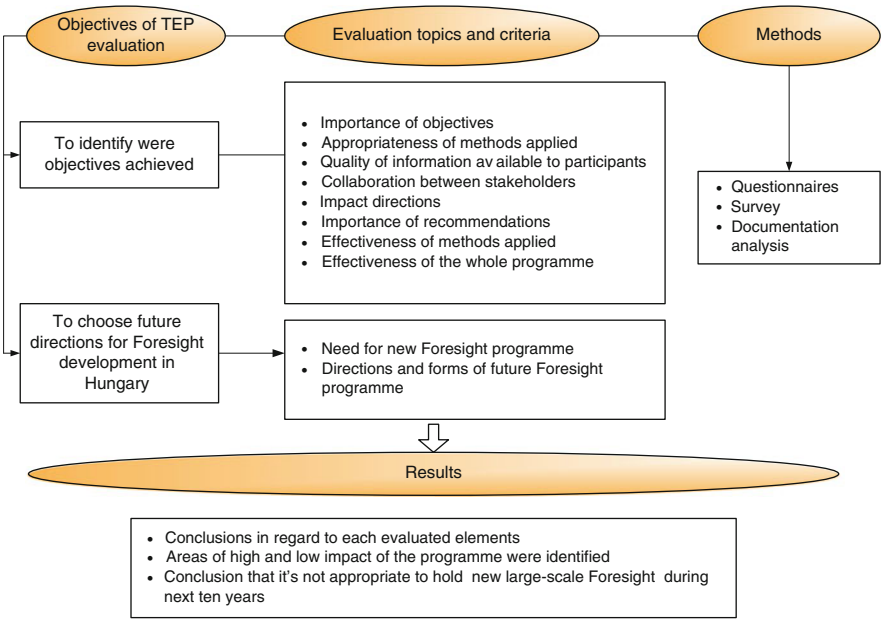

Fig. 2.3 The main elements of TEP evaluation

United Kingdom, and to find appropriate solutions to topical social problems (Georghiou et al. 2006).

Evaluation procedures play a significant role in the development of the UK Foresight Programme. The changes that took place in the Programme's structure after the second cycle were triggered by the results of its evaluation during the first cycle. Evaluation of the cycle conducted in 2005 included an analysis of the Programme as a whole, as well as several separate projects. The evaluation conclusions were prepared with regard to objectives, process, outputs, impact, and value for money (Fig. 2.4).

2.2.3 Vision 2023: Strategies for Science and Technology

Vision 2023 was initiated by the Scientific and Technological Council of Turkey (TUBITAK) for the purpose of forming a vision for the development of science and technology in Turkey until 2023 (Saritas et al. 2007). Lists of priority areas of science and technology and of strategic technology fields were identified as a result of this Foresight programme.

A group of experts conducted an evaluation of Vision 2023 in 2006 in order to analyse key elements of the Foresight process (resources allocation, methodology, etc.) and results (expert panel reports and process gain, including broad

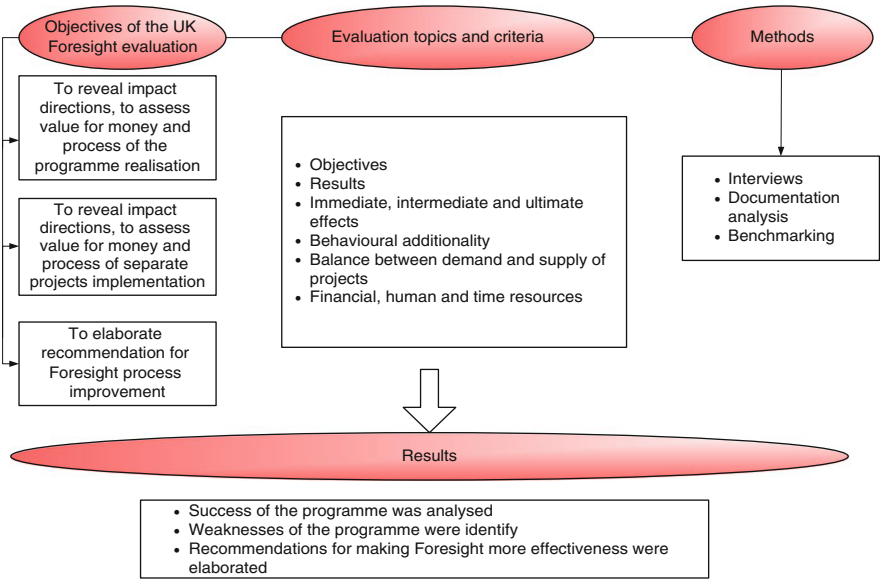

Fig. 2.4 The main elements of the U.K. Foresight evaluation

participation, coordination, public awareness, social commitment, focusing future, learning of individuals, and experience) (Dursun et al. 2011). Strengths and weaknesses of the Programme were identified as well and the evaluation procedures were conducted through three main steps: system construction, application, and reporting. The framework of the Vision 2023 evaluation is shown in Fig. 2.5.

2.2.4 Colombian Technology Foresight Programme

The Colombian Technology Foresight Programme is one of the most complex Foresight studies in Latin America. The key objective of the Programme was "to steer national skills in technology watch and Foresight towards the development of strategic areas of science, technology, and innovation applied to the knowledge economy" (Popper et al. 2010: xxiii).

The appraisal of the Colombian Technology Foresight Programme is a brilliant example of a so-called "fully-fledged" evaluation (Popper et al. 2010). It presents an analysis of different aspects of the Foresight process and impact (Fig. 2.6), and provides recommendations for aligning the Programme with the implementation environment as well. Moreover, the evaluation procedures "identify new products and services; new policy recommendations and research agendas; new processes and skills; new paradigms and visions; and new players" (Popper et al. 2010: 59).

Although the evaluation projects mentioned above have their own specificity, several common features are revealed through comparative analysis. Evaluations of

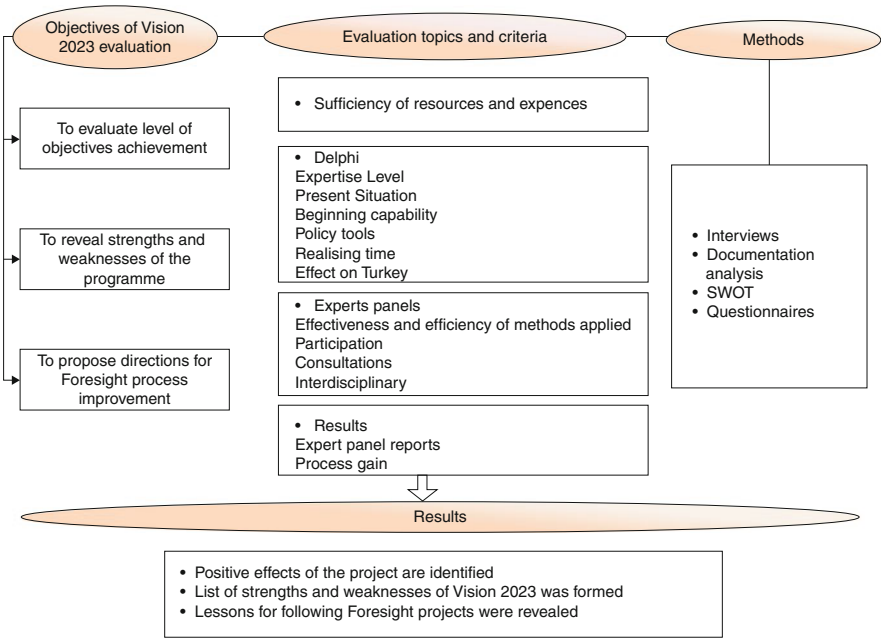

Fig. 2.5 The main elements of "Vision 2023" evaluation

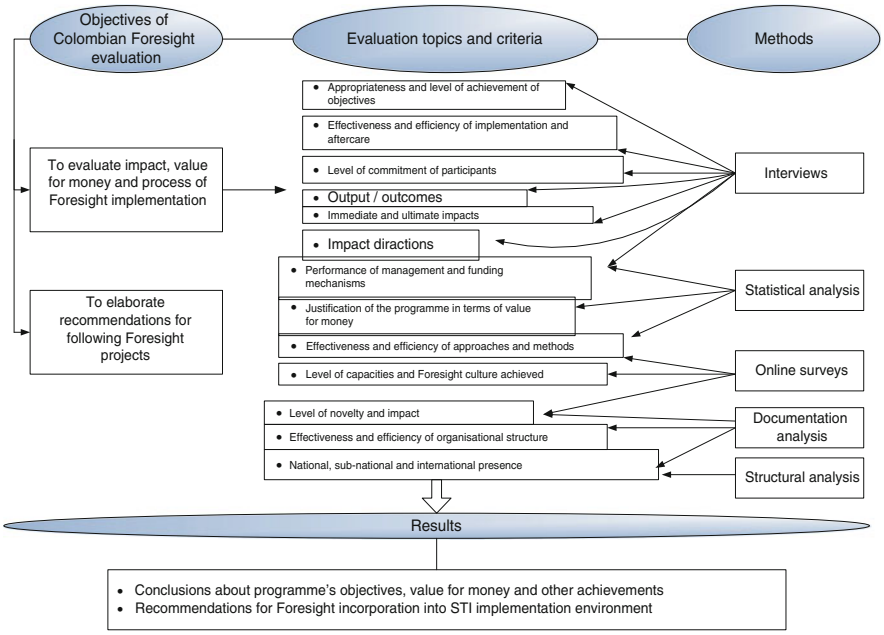

Fig. 2.6 The main elements of the Colombian Foresight evaluation

Foresight programmes are usually aimed at an analysis of implementation, results, and impact, although sometimes strengths and weaknesses are identified, and lessons for future Foresight studies are drawn. Moreover, specific goals suitable to each evaluation project should be taken into account. Generally, the most widespread evaluation objectives are:

- Analysis of Foresight processes, results, and impact;
- Identification of strengths and weaknesses;
- Elaboration recommendations for Foresight improvement.

The most common used evaluation method was the interview: in all of the evaluation projects reviewed, at least one interview was conducted. Questionnaires and surveys, as well as statistical instruments were regularly used.

Evaluation projects generally produce reports with regard to key evaluation topics, characteristics of advantages and disadvantages of a programme, and lists of lessons and recommendations.

A number of approaches have been developed as a result of Foresight evaluation projects, although several methodological gaps still exist, namely: the absence of measurement standards for particular criteria analysis; insufficient use of quantitative methods; lack of information openness and transparency. These factors impede the effective dissemination of knowledge in the Foresight evaluation field and make the results of evaluation projects difficult to compare. It is therefore crucial to address the weaknesses of the evaluation methodologies mentioned above.

Specific steps for the evaluation process should be developed for each particular project. For instance, the evaluation of the Colombian Technology Foresight Programme includes the following stages: scoping, understanding, evaluating, and learning. The evaluation plan is developed at the first stage, while interviews and data analysis are conducted at the second stage. At the third stage, intermediate results are presented and discussed with experts and benchmarking is conducted. At the final stage, an evaluation report is prepared and validated (Popper et al. 2010). Construction of the evaluation system, application of the system, and reporting are the key stages in the evaluation process for "Vision 2023". The first stage is comprised of identifying objectives and data resources, choosing evaluation tools, and creating an evaluation model. At the next stage, methods are implemented and findings are presented (Dursun et al. 2011).

To sum up the above-mentioned examples of stages in Foresight evaluation processes, four common elements are identified:

- Preparatory stage;
- Identification of evaluation criteria;
- Data collection and analysis;
- Presentation of findings.

At the first stage necessary preparatory procedures (e.g. evaluation objectives, methods and members of project team are identified) are conducted. The activities of the second stage are aimed at identifying indicators for evaluation. Data collection and implementation of the evaluation methods then take place during the third

stage. The final step of the evaluation process is the formulation of general conclusions that describe whether the project was a success or not, identify the factors which led to this success or failure, determine the project's strengths and weaknesses, and provide recommendations for follow-up Foresight activities.

2.3 Project Management Experience

The field of project management offers substantial experience regarding evaluation procedures. A project can be defined as "a temporary endeavor undertaken to create a unique product, service or result" (PMI 1996: 4) and "a complex series of non-routine tasks directed to meet a specific goal" (Phillips et al. 2002). The results of Foresight studies (policy recommendations, roadmaps, lists of key technologies, etc.) can be justly defined as a "unique product", and Foresight meet the requirements of time limitation ("temporary"), "non-routine", and "specificity". Therefore a Foresight project is, in essence, a standard project with its own specificity. Thus, it is appropriate to implement methods and approaches suitable for project assessment into an evaluation of a Foresight project (Fig. 2.7). In other words, the methodology of Foresight evaluation could be supplemented by some of the approaches and methods used in project evaluation.

Project evaluation was considered to be important mainly for financial decision-makers due to their need to balance investment risk and expected profit maximisation (*financial approach*). Moreover, investors and other project stakeholders were interested in ex-post information on effectiveness and efficiency of resource (time, financial, etc.) allocation.

The evaluation of a project as a series of interlinked activities aimed at the creation of a "unique product or service" may be conducted as well (PMI 1996). According to this definition of a project, economic (resource) aspects should not be the only ones analysed. Objectives, stakeholder behaviour, and organisational structure should also be assessed (*broader approach)*. A variety of methods and evaluation techniques exist for the purpose of assessing a project's performance and expected profitability although most methods are primarily aimed at justifying a project from a financial perspective. Thus, the methods are quantitative, and the evaluation indicators applied are linked with expected profit in one way or another. In some research papers, about twenty-five assessment techniques are described, and these techniques form five groups of evaluation methods (Remer and Nieto 1995a, b): net present value methods, rate of return, ratio method, payback methods, and accounting methods.

A broader project management approach concentrates on evaluating the entire project; not only financial aspects are taken into account. Project objectives, stakeholders, additionality, impact, and effects are analysed together with resources. Various methods and criteria are provided for the evaluation of the project's objectives. According to the SMART-criterion, project objectives should be Specific, Measurable, Achievable, Relevant, and Timed, while the ABCD-rule

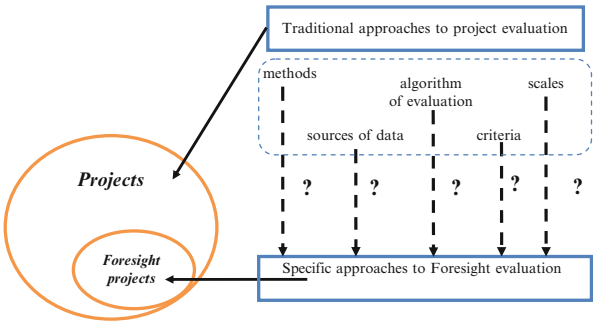

Fig. 2.7 The place of Foresight in the field of project evaluation

defines a measurable objective as one containing information on the target Audience, Behaviour expected from the latter, Conditions and Degree of accomplishment (e.g. Phillips et al. 2002; HM Treasury 2003; Ricker et al. 1998). Moreover, project objectives have to meet the criteria of appropriateness and relevance. These can be included in the list of common criteria for process evaluation as well as effectiveness, efficiency, credibility, reliability, validity and sustainability (e.g. Zarinpoush 2006; Phillips et al. 2002; Westat 2002). Significant attention is given to the analysis of additionality as an evaluation criterion, which was introduced by Buisseret in 1995. Both input additionality ("the proportion of inputs which would not have been allocated without public support") and output additionality ("the proportion of outputs which would not have been achieved without public support") are used as important criteria in both financial and broader approaches (Georghiou et al. 2004b). Both quantitative and qualitative methods are used extensively in the project management approach, and the following methods are applied most commonly: questionnaires, interviews, observations, documentation analyses, presentations, focus groups, statistical methods for data analysis, portfolio methods, and multi-criteria analysis (e.g. Zarinpoush 2006; Westat 2002; Eilat et al. 2008; Ricker et al. 1998; Bohanec et al. 1995).

Similarities and distinctions between the financial, the broader project management approach, and the Foresight evaluation approach are presented in Table 2.1.

Given the fact that Foresight has several specific characteristics, the process of its evaluation differs considerably from the traditional project evaluation framework. First, the purpose of evaluation is different. Project evaluation concentrates on the efficiency of fund usage or the economic justification of a project (especially for investment projects), and searches for ways to improve the project's design. Meanwhile, Foresight evaluation emphasises the importance of project success, and the influence of results on the future directions of Foresight development. As the purposes of evaluation determine the general design of the process, the evaluation framework is constructed in different ways. Significant attention is paid to pre-evaluation procedures in the broader approach: evaluators conduct in-depth analysis of data sources and methods for data estimation, and also identify barriers for full-fledged evaluation and opportunities for overcoming these obstacles. A preliminary stage takes place in the Foresight evaluation process as well. However, this

Table 2.1 Comparison of project management and Foresight evaluation approaches

Criteria for comparison	Traditional project evaluation approaches		Foresight evaluation approach
	Financial approach	Broader approach	
Purposes of evaluation	Evaluation of economic efficiency and effectiveness	Evaluation of the whole project performance; providing recommendations for project development and improvement	Analysis of project's success; evaluation of its impact; development of recommendations for follow-up Foresight projects
Common criteria for evaluation	Simple rate of return; payback period; benefit-cost ratio; net present value; effectiveness; efficiency	Effectiveness; efficiency; appropriateness; relevance; eligibility; credibility; reliability; validity; sustainability	Efficiency; effectiveness; appropriateness; relevance
Types of methods used	Mainly quantitative methods	Qualitative and quantitative methods	Mainly qualitative methods
Methods used	Cost-benefit analysis; cost-effectiveness analysis; payback methods; accounting methods; discounted cash flow analysis; multi-criteria analysis; other statistical analysis	Questionnaires; interviews; observation; documentation analysis; group discussion; presentation; focus group; statistical analysis; multi-criteria analysis	Questionnaire; documentation analysis; interviews; surveys (including online surveys); benchmarking
Evaluation results	Economic effectiveness and efficiency of a project are determined	Performance of project is estimated; ways for project improvement are identified	Success of a project is determined; strengths and weaknesses are described; recommendations for continuing or stopping Foresight are developed

stage comprises only evaluation plan development (as usual, "for internal use only") and the listing of selected evaluation criteria without any specifications. As a result, information on the principles of selection of evaluation criteria and methods is limited. Furthermore, the project management approach highlights the necessity of identifying key evaluation stakeholders, while no attention is given to this issue during analysis of Foresight.

There are several similarities between evaluation criteria applied by the broader approach for project evaluation, and the approach used for Foresight evaluation. The common criteria were taken from the broader approach and then used in Foresight evaluation. However, there is a significant disadvantage: effectiveness and efficiency are assessed mainly with qualitative methods, although originally the

criteria should be estimated quantitatively. Analysis of other criteria is implemented according to different scales that are not formalised; for this reason, the results of different Foresight evaluation initiatives become incommensurable.

Issues related to the evaluation process framework are widely studied in the field of project management (e.g. Zarinpoush 2006; IFAD 2009; Grun 2006; CAP 2010). The number and content of stages differ for each evaluation process. Some authors suggest dividing the evaluation process into five stages: establishing the evaluation focus and its expected outcome; choosing alternatives; comparing the actual outcome with the targeted one and with the effects of alternatives; presenting the results and recommendations; disseminating and using the results and recommendations (HM Treasury 2003). Other authors propose the following stages: developing a conceptual model; identifying key evaluation points; developing evaluation questions and identifying measurable outcomes; creating an evaluation design; collecting data; analysing data; and providing information to interested audiences (Westat 2002). The Japan International Cooperation Agency has developed a project evaluation framework that includes three basic stages: evaluating project performance; assessing value judgment; and providing lessons, recommendations, and feedback to the next stages of the project or other projects (JICA 2004). For the purpose of this research, the evaluation stages commonly applied in the project management approach were identified and adjusted (based on HM Treasury 2003; Zarinpoush 2006; IFAD 2009; Grun 2006; CAP 2010; Westat 2002; JICA 2004).

The synthesized process of evaluation is therefore comprised of the following five stages:

- Preparation;
- Modeling;
- Data collection and analysis;
- Economic analysis,
- Presentation and dissemination of findings.

The first stage aims to create the necessary conditions to support the evaluation process and the development of an evaluation plan. Key elements of the evaluation process (actors, indicators, outcomes, methods, budget, etc.) are identified during the second stage. At the next stage, information related to the assessed project is collected and analysed. Methods of economic evaluation are implemented during the fourth stage. As a result of the evaluation, the performance of the entire project is determined, and the directions for project improvement are provided. Finally, these findings are disseminated to the target audience. Thus, the project evaluation approach provides a complex methodology of project analysis from different perspectives.

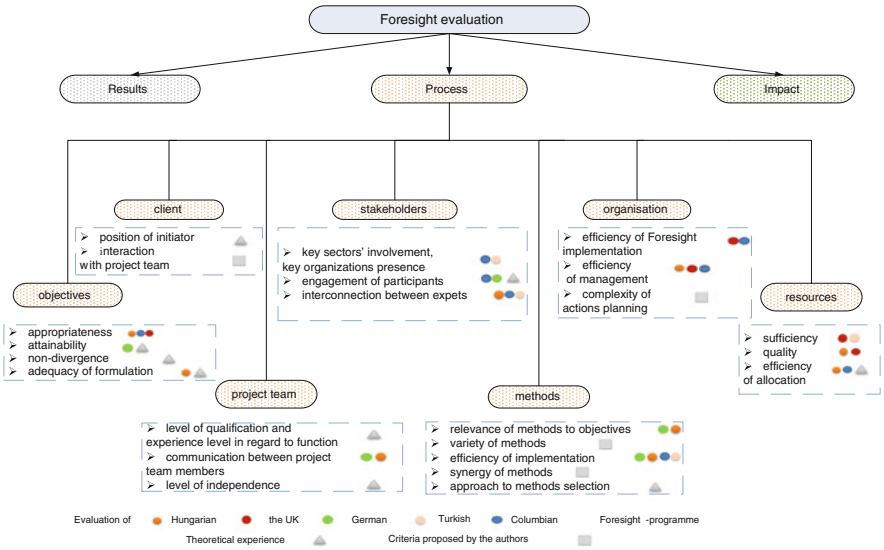

Fig. 2.8 The main evaluation topics and criteria. (Theoretical experience includes the main findings from Amanatidou and Guy (2008), Destatte (2007), Georghiou and Keenan (2006), Meissner and Cervantes (2008), Rijkens-Klomp and van der Duin (2011))

2.4 Findings

2.4.1 Evaluation Criteria

A complex analysis of theoretical issues and practical cases allows for the identification of key elements of the evaluation system: topics, criteria, and methods. The main evaluation topics are objectives, project team, client (initiator), stakeholders, methods, organisation, resources, results and impact. The criteria proposed by the above-mentioned scholars and developed through several practical cases were systematised and distributed in accordance with the topics (Fig. 2.8).

The proposed criteria[6] can be included in evaluation methodology suitable for a variety of Foresight studies. The main criteria for objectives are appropriateness, level of achievement, and adequacy of formulation. Interviews with project team members, experts, and stakeholders, along with a comparative analysis of plans and results allows for thorough assessment of these indicators. The effectiveness of Foresight depends greatly on the professional characteristics of the project's team members. Significant attention should therefore be paid to the qualifications,

[6] There is a wide range of indicators for the last two topics evaluation: specific criteria are developed and applied to meet a particular project's needs (e.g. Johnston 2012; Chan and Daim 2012; Miles 2012; Kappel 2001). In-depth analysis of Foresight results and impact is beyond the bounds of the research: it's an issue for further development.

experience, and level of education of the Foresight team members. Moreover, the identification of the level of independence would be useful during the development of recommendations for the improvement of the Foresight process. Evaluation topics devoted to the analysis of initiator's position[7] and stakeholder behaviour are aimed at providing information about the actors "external" to the Foresight process and their impact on the success or failure of a programme.

A great variety of criteria and indicators has been developed for the purpose of methods evaluation. The relevance of methods can be assessed through the contribution of each method to the achievement of a particular objective. Benchmarking reveals differences between methods applied during a programme and similar Foresight studies throughout the world. A variety of methods is evaluated in accordance to the inclusion instruments from each apex of the Foresight-diamond (Popper 2008).

The effectiveness of the organisational structure and complexity of action planning are analysed throughout all stages of the Foresight process: pre-Foresight, recruitment, generation, action, and renewal (Miles 2002). The inclusion of effectiveness, efficiency, value for money, and value added into the evaluation focus contributes to a more detailed description of a programme, which in turn allows for the increase in quality of the evaluation output.

2.4.2 Evaluation Framework

Certain stages of the project evaluation process – such as designing an evaluation model, and economic analysis – are not usually included in Foresight evaluation. Several differences connected with the applied criteria and methods take place during all stages of evaluation. Some of these differences can be explained by Foresight specificity, while others should be eliminated in order to obtain a higher quality of evaluation procedures. Thus, the framework of a Foresight evaluation process can be improved by supplementing it with several project evaluation elements (Fig. 2.9).

The development of an evaluation model is an indisputable advantage of the traditional approach. Modeling should be added after the preliminary stage of Foresight evaluation as a fundamental element of the evaluation process. The model of an "average" evaluation, detailed above, is based on: identifying the main evaluation steps; choosing the executive member of the evaluation team at each stage; and trying out different evaluation procedures. Therefore, modeling will help to prevent potential mistakes and overcome barriers to evaluation with fewer wasted resources. In addition, it may provide a more quantitative and detailed evaluation process. Several steps are necessary to guarantee the successful

[7] Capability to influence on the situation in national innovation system (Meissner and Cervantes 2008).

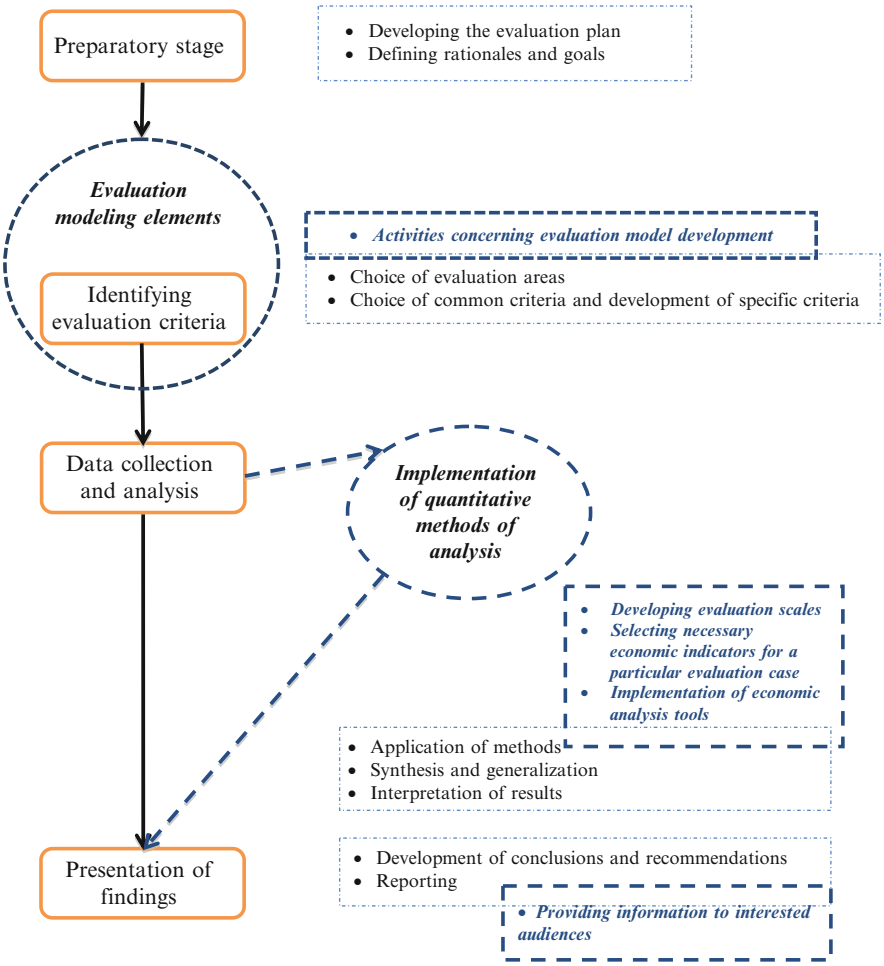

Fig. 2.9 The supplemented framework of Foresight evaluation

implementation of this recommendation: developing the samples of the evaluation model for projects of the same type (e.g. for national, regional, sectoral, etc.) and with similar purposes; identifying the projects' specific features that can influence the evaluation framework; providing a set of tools for modeling with regards to Foresight peculiarities. The first lesson from project management is to include the modeling stage in Foresight evaluation.

Another proposed change concerns the more extensive implementation of quantitative methods. By incorporating quantitative methods into Foresight evaluation, results from different evaluation projects could be comparable and the level of subjectivity would decrease. For instance, when education and qualification levels are estimated, it is reasonable to use quantitative indicators such as the share of members with a PhD, the number of previous successful Foresight-projects, etc.

It would probably be useful to estimate the extreme endpoints of indicators for different types of projects. The identification of these extremes would be based on international experience and expert opinions. Such methods as ranking, scoring, bibliometrics, statistical, and approximate analysis can be applied. Thereby the extensive use of quantitative methods corresponds to the second lesson learnt from project management.

In order to implement the previous recommendation, it is necessary to take into account the third lesson: development of common benchmarks to evaluate each criterion. The main method for forming benchmarks is expert analysis based on international Foresight evaluation experience. One of the most significant requirements for this is a wide dissemination of information concerning the rules and methods of estimation, and the interpretation of results. The implementation of common evaluation scales will in turn help to reduce the time and resources consumed in the preparatory and modeling stages.

Both quantitative methods and common benchmarks are closely tied to the fourth lesson for the improvement of Foresight evaluation methodology. Such evaluation topics as output and effects are analysed principally from an economic or financial perspective. Effectiveness, efficiency, value for money, and value added are, in essence, financial indicators, therefore an economic approach to evaluation is an essential requirement for getting results. Cost-benefit and cost-effectiveness analysis, discounting, and statistical methods should be applied. Thus, adding elements of economic analysis to the framework of Foresight evaluation may provide a more complex and complete evaluation as well as effective management of follow-up projects. Obviously, methods of economic analysis applied in project management should be adjusted to suit the specificity of Foresight projects. The development of a software solution for evaluation needs based on quantitative methods, common evaluation scales, and elements of economic analysis is a way of increasing the efficiency of the evaluation process. The software would be able to conduct several procedures of data analysis, which in turn would provide evaluators and experts with more structured and formalised information, as well as reduce the time consumed.

Results of Foresight evaluation should be available for interested audiences. The foundation of a specific organisation of Foresight evaluators would guarantee openness and transparency of evaluation results. For example, brief outlines of the final evaluation reports (if full reports are classified) would be placed on the website of the organisation. The European Foresight Platform (EFP) follows this practice when it comes to its Foresight project descriptions. The proposed organisations could likely operate in a framework similar to EFP. Thus, the fifth lesson from project management is to provide more openness and transparency for evaluation results.

2.5 Conclusion

Given the variety of applied evaluation approaches and the lack of common methodology, the development of an integrated approach to Foresight evaluation was crucial. Literature concerning various assessment approaches (including the project management approach) was investigated. Several recent and remarkable Foresight evaluation projects were examined as well.

Key evaluation topics were identified (objectives, project team, client, stakeholders, methodology, organisation, resources, results, and impact). The crucial stages of the evaluation process were determined. The proposed stages for Foresight evaluation can be used as a basic framework for assessment procedures and may become a pattern for the following evaluation exercises.

The analysis of the evaluation experience accumulated by project management allows for the identification of several recommendations for the improvement of Foresight evaluation methodology:

- Development of an evaluation model;
- Extensive use of quantitative methods;
- Elaboration of evaluation scales;
- Inclusion of economic indicators in the evaluation;
- Increased transparency of evaluation results.

The proposed topics, criteria, methods, and stages are elements of the complex system of national Foresight evaluation. The system should be further developed, especially with regard to the evaluation of Foresight impact and results. Moreover, separate studies can be devoted to the analysis of a particular evaluation topic. For example, in-depth research should be conducted in order to identify and describe sets of criteria for Foresight methods evaluation.

The proposed evaluation framework may be adopted and modified (some elements can be deleted or replaced, others can be added) to suit the requirements of a particular evaluation process. Generally, the application of the methodology will contribute to making evaluation procedures more standardised, evaluation results less complicated, and outcomes more comparable.

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