# A European Perspective on Innovation Management a Semi-structured Model for the Corporate Innovation System (CIS)


**Merih Pasin, Mehmet N. Aydin, and Ceyda Ovaci**

**Abstract** The new paradigm of digitalization represents disruptive changes for organizations around the world. Companies are facing with highly intense competition. In order to survive and achieve sustainable competition advantage, strategic innovation management becomes essential. In this regard, one of the most significant issues is to design and apply a model that includes a clear roadmap to implement innovation principles and activities to ensure innovation capability and performance of businesses. The first part of the chapter presents state-of-the-art literature on existing innovation management terminologies and models. The other parts provide a semi-structured corporate innovation system (CIS) model and its dimensions. The proposed semi-structured CIS model is articulated in terms of the model dimensions and their instantiations along the rich associated experiences gained via best practices of the successful nationwide innovation program. The proposed CIS is a holistic model that creates value by establishing strategic, cultural, and organizational infrastructure for innovation management. The CIS model provides a roadmap from initial evaluations of innovation performance and strategy formulation to implementation. Besides, the model enables us to customize the roadmap based on six dimensions and 20 key target indicators according to company needs and structure. It is a unique model as it aims to establish a system based on the requirements and readiness of organizations.

**Keywords** Innovation · Corporate innovation management · Management system

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## 1 Introduction

The ability of innovation is evaluated as a key success factor for profitable growth, sustainability of business, and competition for companies. Therefore, organizations need to adopt innovation systems that include different principles such as culture and strategic direction. Since there is no one-size-fits-all approach or model for successful innovation systems for organizations, various frameworks, models, and roadmaps have been proposed by scholars and implemented by practitioners. The contingency theory asserts that the best fit is possible by considering the specific needs of the organizations and customizing the model accordingly. In the context of corporate innovation systems (CIS), this is possible if a semi-structured CIS model is present and customized along the salient characteristics of the organization. Such customization is a matter of applying both science and art of the innovation management to the case at hand. The design and implementation of innovation systems require knowledge on appropriate models, toolsets, and industry experience.

Several nationwide initiatives, programs, and platforms are promoted to share this kind of valuable knowledge between practitioners. However, the literature on CIS, as shall be provided later, indicates there is a need for generic, yet adaptable innovation model taking into account organizations' needs and best practices accompanying customization of the model for effective CIS. This chapter aims to present a semi-structured CIS model that has been used to develop CIS for 129 organizations as part of a nationwide mentor-driven innovation program in Turkey (TIM İnosuit Programı, 2022). The proposed semi-structured CIS model is articulated in terms of the model dimensions and their targets which also include the rich experiences gained via best practices of the successful innovation program nationwide. This chapter demonstrates successful implementation of the proposed CIS model in 129 organizations on various sizes as part of the mentioned nationwide innovation-focused mentor program.

The developed CIS model, which encapsulates an innovation management workflow with 20 main targets and six dimensions to enhance innovation performance of firms is a comprehensive answer to the question of how to start innovation and manage it. Before going over that, it would be beneficial to summarize evolving models of innovation management from the literature. In the next two sections, we address key challenges with the implementation of Innovation Management, and elaborate evolving approaches to deal with them. In Sect. 4, we introduce a CIS model and its six dimensions in detail. Later on, implementation and impact of the proposed model are provided along the best practices gained. We conclude the chapter with the implications of the study for practitioners, innovation support policymakers, and researchers.

## 2 Key Challenges with the Implementation of Innovation Management

The development and spread of the technologies introduced with the new industrial revolution are faster than ever. The radical leap in digital technologies over the past decade has been a major concern for companies to adopt structural configurations, innovation strategies, and policies Nambisan et al., 2019, p. 1). Innovation is a core driver to achieve competitive advantage and economic growth in the changing global environment (Brem & Voigt, 2009, p. 351; Hidalgo & Albors, 2008, p. 113). Therefore, understanding the importance of innovation is crucial for businesses to manage it and survive in a compelling business environment (Tidd, 2001, p. 169–170). However, digital technologies have caused a paradigm shift in the innovation process and methodologies (Yoo et al., 2012, p. 1398).

The digital advancement in industries forces organizations to embrace novel innovation tools and techniques served for innovation management to build organizational resilience (Leonhardt et al., 2018, p. 2; Heinz et al., 2021). Companies struggle to design effective and sustainable governance structures and innovation processes due to the unique characteristics of firms. Besides, it is not possible to suggest a formula or recipe to succeed in innovation management, since organizational structures, industries, digital maturity, and market conditions vary (Dilan & Aydin, 2019, p. 8).

The exponential growth of the digital wave has brought many challenges and opportunities in the innovation field (Yoo et al., 2012, p. 1399; Levine & Prietula, 2013, p. 1). While companies enjoy the growing number of new product developments with the technological improvements, they also feel the intense competitive pressure due to short product and innovation life cycles as well as unpredictable competition. Thus, companies focus on establishing a systematic and holistic innovation management system that encompasses sustainability, agility, flexibility, resilience, and diversity (Niewöhner et al., 2019, p. 826–827). However, there is a definitional confusion and uncertainty surrounding innovation, which is a potential problem for companies in terms of creating a common understanding in the organization and creating a sufficient innovation culture. Furthermore, it is suggested to ensure that the company employees have coherent competencies to execute the requirements of the innovation process (Vey et al., 2017, p. 26).

The implementation of innovation management is sometimes hard to grasp for companies because the processes are iterative, uncertain, and interactive. In addition, companies are assumed to ensure organizational readiness for technology push innovations and change their approach toward innovation. They should adjust organizational culture, strategies, deployment of resources, decision making, interactions, and human resources in line with updated innovation strategies (Agostini et al., 2020, p. 3). Therefore, it might be necessary to start an internal transformation on corporate DNA and promote sufficient innovation in the organization (Vey et al., 2017, p. 25). As a growing number of companies restructure their innovation systems, digitalization provides platforms to enlarge value creation networks, ecosystems,

and interdisciplinary communities that promote openness, affordances, and generativity (Nambisan et al., 2019, p. 3). Indeed, digital platforms turned into significant innovation enablers for companies to collaborate with external stakeholders and share knowledge for problem-solving, idea generation, and co-creation (Hossain & Lassen, 2017, p. 2–3).

## 3 Evolving Approaches of Innovation Management

The concept of innovation, which includes novelty and creativity in its essence, was first used by economist Schumpeter (1934) (Hidalgo & Albors, 2008; Trott, 2005). Schumpeter considered innovation as the main component of economic development and defined it as "making differences in economic life." Schumpeter's innovation theory enlightened the creation of value at a more macrolevel. In the following years, researchers carried out studies on the benefits that can be achieved with enterprises' innovation management at micro-level (Xu et al., 2006). Thus, several innovation management approaches that are illustrated by schematic flows in the literature began to emerge. Utterback (1971) introduced the first graphical innovation process model (Bagno et al., 2017, p. 638). Indeed, innovation models have evolved from simple linear models to complex collaborative ones due to rapid developments in technology and globalization. Du Preez and Louw (2008, p. 1) stated that existing models are not adequately comprehensive with different components and implementation areas. Thus, they introduced a roadmap generated by combining diversified innovation management concepts to guide small- and medium-sized enterprises to specifically enhance their open innovation practices. However, the fact that this proposed model is intended for SMEs prevents it from being a model with a wide application area. Nevertheless, it is assumed that there is still a gap of implementation-oriented corporate innovation system model design in the literature.

There is a considerable number of definitions for "innovation management" and combination of various terminologies and concepts in the literature. Hansen and Birkinshaw (2007) describe innovation management "as the active and conscious organisation, control and execution of activities that lead to innovation" (Eveleens, 2010, p. 3). According to Ojasalo (2008, p. 3), innovation management refers to "the management of the whole process of innovation from the idea generation stage through product or process development/adaption to launch in the market or start." Another definition emphasizes management functions, "a systematic planning and controlling process which includes all activities to develop and introduce new products and processes for the company" (Brem & Voigt, 2009, p. 352). Although most of the innovation management models involve different approaches, definitions emphasize designing a process that involves a pattern of similar steps or stages, such as idea generation and identification, conceptualization, evaluation, selection, and implementation (Du Preez and Louw, 2008, p. 2–5). In fact, this can be interpreted that innovation models and innovation process models are used interchangeably in some studies (Zartha et al., 2019, p. 188–189). The initial step of managing innovation is to

conceive how the innovation process can be influenced and create the best practice model (Eveleens, 2010, p. 2–3). To sum up, what most definitions *do* agree on is the overall "improving the competitive position" through generating firm-specific, integrated, and collaborative innovation systems with cross-functional management activities.

As noted previously, many significant insights have been created into the innovation process with several models, but there is still a lack of comprehensive framework to lead management implementations (Tidd, 2001, p. 170). Moreover, innovation management models do not offer patterns that include a clear roadmap to initiate innovation practices and ensure sustainable innovation capacity and performance (Zartha et al., 2019, p. 188).

In order to build a common understanding of innovation management approaches, some fundamental considerations will be summarized here. The ultimate goal is to indicate changes in the models. It is possible to find many meta-analysis studies summarizing innovation models in the extensive literature (Verloop, 2004; Jacobs and Snijders, 2008 Eveleens, 2010; Lopes et al., 2012; Cortimiglia et al., 2015; Bagno et al., 2017; Zartha et al., 2019).

Rothwell (1994) five generations innovation model is one of the best-known examples of generation-based innovation management frameworks. He performed a historical overview of models from the 1960s onwards and focused on the evolutionary development of innovation strategies of companies (Bagno et al., 2017, p. 638.). Other major studies on the analysis of innovation models have a general tendency to work in the framework of Rothwell in five generation sequences (Kotsemir & Meissner, 2013, p. 5). Kotsemir and Meissner (2013, p. 10) claimed that Rothwell's framework is a universal and mandatory reference model, and that there is no proposal on the sixth generation of innovation management models. They explained the reason as follows: All the emerging trends in innovation such as networking and outsourcing can be classified under interactive innovation models, namely the fifth generation. However, in some studies, the sixth generation (Marinova & Phillimore, 2003; Barbieri & Álvares, 2016, p. 119) or even the seventh (Du Preez and Louw, 2008, p. 6) generation of innovation models was mentioned. Yet another study by Chiesa et al. (1996) put an emphasis on a technical innovation audit perspective, but its implementation with real-world cases appears to be limited (Table 1).

First-generation models focused heavily on the scientific knowledge produced by R&D. Innovation was driven by technology through a simple linear process. Second-generation models had recognized the market as a source of ideas that operated in R&D. Third-generation models tried to combine market and technology in order to trigger a process which was also linear design similar to the prior models. Fourth-generation models emphasized creating dynamic linkages and alliances and integrating activities and functions in house departments. Fifth-generation models regarded innovation as a continuous, integrated, and flexible process. System integration and extensive networking were the key features of this generation (Barbieri & Álvares, 2016, p. 119; Bagno et al., 2017, p. 638).

**Table 1** Brief comparison of historic overview of innovation models

| Generation | Rothwell framework (1994) | Key features | Marino and Philimore framework (2003) | Key features |
|---|---|---|---|---|
| First (1950s–First half of 1960s) | Technology push models | Simple linear<br>R&D oriented<br>Scientific discovery → technological development of product → selling of product on market | The black box model | Innovation is regarded as an economic activity<br>No explanation of R&D characteristics |
| Second (Second half of 1960s–Early 1970s) | Market-pull models | Simple linear<br>Market oriented<br>Market need → development → manufacturing → sales | Linear models (Technology push and need pull) | New product developments through basic science discoveries<br>Causes of innovation are existing demands |
| Third (Early 1970s–early 1980s) | Coupling model | Recognizing interaction between different elements and feedback loops between them<br>Technological capabilities and market needs-oriented<br>Interacting and interdependent stages | Interactive model (Coupling and integrated models) | Complex interactions between science, technology, and the market<br>Iterative innovation process |
| Fourth (Early 1980s–Early 1990s) | Integrated innovation process models | Parallel integration and functional overlap in house departments<br>Integration within the firm, upstream with key suppliers and downstream with demanding and active customers, emphasis on linkages and alliances | Systems model (Networking and national systems of innovation) | Dynamic, industrial, strategic innovation networks<br>Interactions, inter-connectedness, and synergies |

(continued)

**Table 1** (continued)

| Generation | Rothwell framework (1994) | Key features | Marino and Philimore framework (2003) | Key features |
|---|---|---|---|---|
| Fifth (Since Early 1990s–…) | Integrated interconnected parallel and flexible innovation process models | Joint R&D ventures/strategic alliances<br>Collaborative precompetitive research<br>Systems integration and extensive networking, flexible and customized<br>Response, continuous innovation | Evolutionary model | External environment in which technologies developed<br>Population perspective and variation<br>Generation of variety<br>Selection<br>Reproduction and inheritance<br>Fitness and adaptation |
| Sixth | | | Innovative milieu | Productive system<br>Active territorial relationship<br>Local collective learning process |

*Source* Adapted from Tidd et al. (2005); Eveleens (2010); Kotsemir and Meissner (2013)

Even though there are several common features of classification according to Rothwell, Marina, and Phillimore framework, the evolution was divided into six generations in Marina and Phillimore study. Besides they analyzed the models through a macroeconomic perspective to provide an understanding of innovation for the whole economy. They argued that the first three models were sequential. Although the system and evolutionary models focused on the interaction between actors, the system model described the system of relationships and trigger factors behind it (Kotsemir and Meissner, 2013, p. 7–8). The proposed sixth generation focused on geographical locations and territorial organizations as an important factor for the innovation process. Although a time interval is defined for each model, these models are still used today, when needed.

Xu et al. (2006) proposed the total innovation management model, which is defined as an ecological system directed by strategy innovation. It is claimed that the TIM model penetrates time/space reference of a firm. Besides, the model emphasizes that all employees should be a part of innovation. However, the TIM did not take organizational differences into account. Moreover, it does not provide a roadmap that includes the objectives and dimensions of how innovation management should be realized. In addition, information regarding the implementation experiences of the TIM model was not shared. There are points that intersect with the model presented in this chapter such as the importance of organizational culture (Xu et al., 2006, p. 15–17).

To sum up, a range of models indicated that innovation includes a set of functions consisting of many different components to manage and assess in order to understand innovation capacity and performance. The key components of innovation management that contribute to organizational innovation capabilities are listed below (Björkdahl & Börjesson, 2012, p. 77–178; Igartua et al., 2010).

- The Strategy of Innovation: Comprehending the direction of innovation activities with strategy formation. Innovation strategies should be consistent with the company's mission, vision, and purposes.
- Prioritization of Innovation Portfolios: Organizations are recommended to prioritize innovation projects/ideas/problems/suggestions that generate value to satisfy the company's needs. Selecting and creating a portfolio is a dynamic process due to the constantly updated structure of innovation projects. Besides, it is noted that prioritization should be in line with innovation strategies.
- Idea and Project Management: Innovation ideas should be managed under a systematic management roof to overcome risks and uncertainties that they inherently have. Thus, it would be easier to follow, assess, and implement the value created by innovative ideas.
- Leadership and Organizational Culture: Leaders should promote and support innovation in the organizations to encourage employees to be part of the process. Also, management support is a significant ingredient for establishing and spreading innovation culture within the organization. For the in-house diffusion of innovation, it must create an innovation climate where failure is tolerated.

- Human Resources: Innovation movements should be integrated into human resource policies of the organization. Human resources are the key element of successful implementation of innovation strategies. Therefore, motivation, recruitment, rewarding of individuals are essential enablers of innovation performance.
- External Relations: Innovation is a critical success factor not to be left to the responsibility of just one person or a department. Thus, collaborations, interactions, or strategic alliances are tools for the creation of mutual benefit through sharing knowledge for innovation outside the company as well as within.
- Organizational Design: Organizational infrastructure should reflect the purpose and strategies of innovation in the organization. Therefore, it would be necessary to redesign the organizational structure and diffuse innovation authority within the organization for interaction.
- Implementation: The implementation phase should be structured to enable an efficient and effective flow. The innovation process, which should be designed as an iterative process, should be open to continuous improvements. In order to transform ideas into value, a properly designed implementation system is needed.
- Knowledge and Intellectual Property Management: All activities related to innovation in the organization must be protected within the framework of the principles determined in the directives. Especially knowledge management is an important part of innovation.
- Technology: Technology is a fundamental ingredient of innovation. Technological trends and emerging technologies should be scanned. Organizations prepare themselves for changes by anticipating the effects of technologies on their business with the roadmaps they generate.

As it is widely appreciated, innovation management is one of the fundamental functions for many businesses. In addition, the ability to renew the organization and provide continuous innovation performance in a rapidly changing environment is another challenge for companies (Steiber & Alange, 2013, p. 243–244). In some studies, innovation and sustainability have been associated with innovation outputs such as reducing raw material or energy costs, preventing negative influence on the environment, and so on (Shin et al., 2018, p. 2). Within the scope of the proposed model in this study, sustainability indicates the continuity of corporate innovation performance. What is meant by the sustainability of the corporate innovation system is that the current structure is a set of processes that offer innovation in all changing conditions.

To summarize, the model proposed in this study differs in three aspects from the existing ones: (i) targets of the model; (ii) scope of the model dimensions; and (iii) implementation of the model. The targets suggested in the model are related to dimensions. The dimensions of the model are more comprehensive and explanatory. The dimensions and objectives of the model provide a roadmap that will enable companies to reflect their original structures. Existing models are inadequate for establishing a roadmap for organizations that will consist of targets and various phases. However, in this model, an area is recognized that allows institutions to develop original methods

by which they can reflect their own business style and corporate culture in achieving the proposed dimensions and goals. In addition, academicians who are experts in innovation management act as mentors in the field implementation of the model. In this context, mentors, presented in the semi-structured model, are incorporated into companies in a unique way with their knowledge and experience.

The semi-structured corporate innovation model proposal will be explained in the following sections. This model has been implemented in 129 different companies successfully nationwide in Turkey (TIM Inosuit Programı, 2022). The compatibility of six dimensions and 20 targets used in the model was confirmed with qualitative and quantitative data collected from the companies which attended the program.

## 4 Corporate Innovation System Model (CIS)-Six Dimensions of the CIS Model

The proposed CIS model consists of six dimensions and an additional element to ensure the sustainability of the corporation innovation system adopted. Figure 1 demonstrates each dimension as a facet of the innovation cube to put an emphasis on its holistic characteristics. In the following section, we shall discuss the model with its dimensions in terms of underlying concepts and their operationalization with fine-grained elements that need to be instantiated as an organization-specific model. Furthermore, the proposed model is articulated with a set of key targets to achieve along with its implementation.

***Innovation Strategy***

This dimension aims to establish the foundation of strategic elements for an organization including innovation strategy, its alignment with the strategy at the corporate

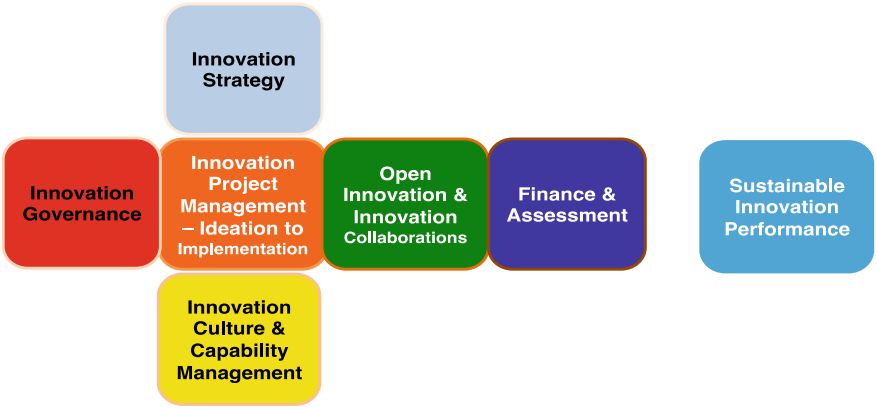


**Fig. 1** Dimensions of corporate innovation system model

level, and other relevant units, including R&D. Furthermore, there is a need for the generation of strategic insights associated with innovation strategic options and effective planning that incorporate innovation portfolios and roadmaps (product, technology, etc.). One can consider well-known innovation strategy options such as the type of innovation (product, process, business model, etc.), degree of openness, and the scope of innovation (Dilan & Aydin, 2019). Innovation strategy should incorporate both the dynamics and structural aspects of an organization. Also, it can be employed as part of a strategic thrust. Its dynamic nature indicates temporal scenarios (short, mid-, long terms); and its structural element exhibits organization position as a leader with close followers in certain venues. Its uniqueness is inevitable and reflects intriguing and novel thinking embedded in its formulation.

***Innovation Governance***

The very idea of governance refers to an appropriate decision-making process and organizational configurations that fit an organizational situation. Interactions and communications among various parties in the organization require both the structural and dynamic aspects of innovation governance. The principles governing the structure and dynamics are particularly essential to develop and adapt to the organizing logic instantiated in terms of managerial and operational activities. One can consider such organizational arrangements as innovation board and committee. The former indicates an advisory role to achieve an executive commitment, whereas the committee can signify an intermediary role in coordinating and monitoring innovation endeavors in an organization. Company-wide representativeness of involved parties is essential to ensure innovation acceptance at different levels and across departments in an organization.

***Innovation Culture***

The cultural dimension is a common ground to attain a shared understanding, values, and rules underpinning *Weltanschauung* (a way of viewing the world, way of thinking about innovation). Naturally, the language that frames shared understanding of innovation is essential to constitute the worldview toward innovation. As such, its epistemological and ontological foundation, depending on its appropriateness, enables or prevents the progress of innovation in an organization. The former indicates how knowledge is accumulated and embraced at the individual and group levels, whereas the latter is concerned with meanings of basic terms (semantics) and organizational semiotics, and organizational culture (Stamper et al., 2000). The establishment of appropriate innovation culture is a long-term quest and subject to social embeddedness, a degree of unitedness, and other matters that cannot be easily codified.

***Management of Innovation Projects-Ideation to Implementation***

This dimension includes managerial and operational end-to-end activities from ideation to implementation. Managerial activities are concerned with monitoring transitions from one state of innovation progress to another state. One can adopt stage-gate models to design an overall innovation process and descriptions of fine-grained

activities, tools, and techniques needed. Noticeably, the process starts with a set of promising ideas collected from various channels and may require idea management practice and tools. Turning ideation into potential innovation projects and eventually leading to successful outcomes is not guaranteed as the process naturally involves various risks. This dimension does not prescribe any particular roles, responsibilities at different stages of the process, but depending on the types of innovation, one can design specific process route maps to facilitate its implementation.

***Open Innovation and Innovation Collaborations***

The idea of collaborations in the innovation context is applicable to both intra- and inter-organizational scope. The degree of openness and its scope is a matter of strategic choice, but its realization necessitates not only basic interactions and interoperability among relevant actors, but also a unity around shared understanding and sustainable progress. As shall be discussed further later on, in many cases, collaborations are temporal in nature as a specific project and how to extend it to complex and dynamic relations since creating network-based ones is a challenging endeavor. A degree of openness is, on the one hand, a strategic choice, and requires networking capability in intra- and inter-organizational settings. On the other hand, it is a matter of collaboration between individuals, teams, and other organizational arrangements.

***Finance and Assessment***

This dimension is concerned with appropriate performance indicators to measure progress and the tangible outcomes for each innovation projects, and the overall the innovation system. The proposed model assumes varying degrees of innovation readiness for organizations and requires situation-specific targets per time windows such as monthly and yearly ones. The model aims to achieve 20 targets and addresses the challenge of limited resource availability in an organization. Nevertheless, one needs to monitor its process and outcome progress and strive for its sustainability for the long term.

In the following section, we shall explain the implementation of the proposed model and discuss the associations between the model dimensions and 20 targets. We further elaborate on the implications of the model implementation with exemplary cases.

## 5 Implementation and Impact of the CIS Model

This model considers the multidimensional and multi-functional nature of the innovation process and its implementation in companies in the form of corporate innovation system (CIS). It is vital to adapt the implementation of the model to the company's needs because the implementation roadmap varies with the size and the readiness–innovation maturity, as well as other organizational characteristics such as corporate culture, and tolerance to failures, which strongly affects the innovation performance.

The variation among the companies with respect to readiness to implement innovation management system is accounted for the semi-structured approach of the program. This approach enables a customized roadmap. Therefore, innovation model starts with a holistic evaluation of the company with respect to the corporate innovation system, which has six dimensions (Fig. 1), and related 20 targets (Table 2).

Evaluation aims to provide a roadmap to achieve the innovation management system. The CIS provides general guidance and targets to achieve; however, this road map is customized for the company needs based on the initial evaluations. Hence, the model is characterized as a semi-structured innovation management program.

**Table 2** 20 targets for CIS linked to six dimensions

| | |
|---|---|
| Target 1 | Evaluation of innovation capacity and performance |
| Target 2 | Designing an organization-specific corporate innovation system |
| Target 3 | Preparation and implementation of the internal and external communication plan for corporate innovation system |
| Target 4 | Determining innovation strategies |
| Target 5 | Preparation of the institution's technology road map and capability road map |
| Target 6 | Creating innovation project portfolio |
| Target 7 | Preparation of the innovation governance infrastructure |
| Target 8 | Preparation of corporate innovation management directive |
| Target 9 | Designing an idea and suggestion-sharing system |
| Target 10 | Creating the appreciation and rewarding system |
| Target 11 | Integration of innovation to HR applications of the organizations |
| Target 12 | Corporate knowledge and know-how management system |
| Target 13 | Providing innovation management internal trainings and building competence |
| Target 14 | Forming innovation project teams |
| Target 15 | Systematic management of innovation projects |
| Target 16 | Designing open innovation processes and external stakeholders collaborations |
| Target 17 | Designing intellectual property rights procedures |
| Target 18 | Designing R&D projects based on university-industry cooperation |
| Target 19 | Utilizing external finance sources and funds for innovation |
| Target 20 | Evaluation of the effectiveness of the corporate innovation system |

An academic in the innovation management field facilitates and guides the process of forming, and later implementing the customized roadmap for the company with the help of evaluation tools developed for this program.

There are a number of methods to assess the innovation maturity level of a company. Initially, the method proposed by AT Kearney was used. Subsequently, we developed our own tool "Corporate Innovation System and Network Analysis Tool"–CISNAT for this evaluation. CISNAT further ensures the compatibility of the analysis tool with the Corporate Innovation System that aims to establish the model in the company.

Such evaluation tools as AT Kearney or others are a set of questionnaires, filled by the management team with the facilitation of the innovation leader. Hence, it provides the evaluation of a company from the management perspective. However, employee perspective, which is also important for the innovation performance, is left out. Therefore, in addition to the CISNAT evaluation, which is a top-down perspective for innovation management, this method also incorporates a bottom-up perspective, which comes from employees. This is accomplished with a developed tool called innovation perception assessment tool (IPAT). IPAT evaluation is similarly linked to six dimensions and corresponding 20 targets and uniquely provides the employees' take on the innovativeness of the company.

The results from these two tools are combined to finalize the roadmap to achieve the 20 targets, which are the foundation for an effective innovation system. The following section provides an example for this evaluation:

*Dimensional Analysis*

An example for dimensional analysis is given in Fig. 2. It shows that for this particular company, the lowest score is 70%, which is "Innovation Strategy." On the other hand, high scores on "Innovation Culture and Capability Management" and "Innovation Governance" indicate that the company has solid fundamentals for innovation management.

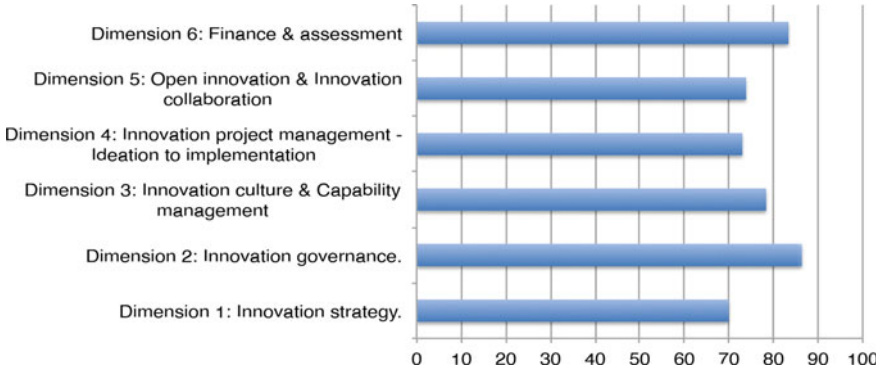


**Fig. 2** CISNAT dimensional results

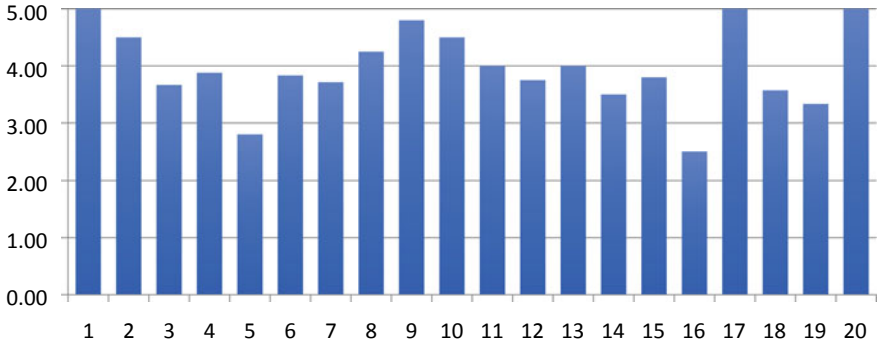


**Fig. 3** CISNAT 20 target results

Outcomes from each dimension are further detailed in 20 targets, as shown in Fig. 3. For each dimension, there are several targets. Continuing with the same example, it is concluded that the low score for "Innovation Strategy" dimension mainly comes from the low scores of Targets 3 and 5.

Action plans are prepared for each target in order to complete the CIS implementation roadmap. Target 5 and the corresponding questions in CISNAT are given below:

**T3: Preparation of Technology Roadmap and Capability Roadmap**

| | | | |
|---|---|---|---|
| 17 | Short-mid-long-term customer needs have been determined | 4 | 2.80 |
| 18 | Product and services necessary to develop in order to meet these needs have been determined | 4 | |
| 19 | Key technologies and capabilities to develop these products and services have been determined | 2 | |
| 20 | Strategies to acquire these technologies and capabilities have been determined | 2 | |
| 21 | Technology roadmap has been prepared, using all internally and externally available sources | 2 | |

Based on these evaluations, one of the actions is to organize a work meeting to determine the key technology and capabilities to support future products and services to meet the customer trends. Also, innovation perception of the company among its employees is analyzed with IPAT, as shown in Fig. 4.

Results from CISNAT and IPAT are compared to show the differences between management and employee views, regarding the innovativeness of the company (Fig. 5).

Based on the evaluations from CISNAT and IPAT, the roadmap for innovation management is finalized. After the roadmap is finalized, the model is implemented. The implementation phases are shown in Fig. 6.

Detailed implementation for a specific company is generated using the above guidelines, together with CISNAT and IPAT results, based on the semi-structured approach of the program.

Last but not least, we also monitor the progress during the use of the model with 20 targets. The following scoring is used for each target: 1: Not started, 2: Limited completion, 3: Partial completion 4: About to be completed, 5: Completed. Posterior analysis of 57 implementation cases is carried out, and the result is published as the Model Impact Report. Descriptive statistical results can also be found in

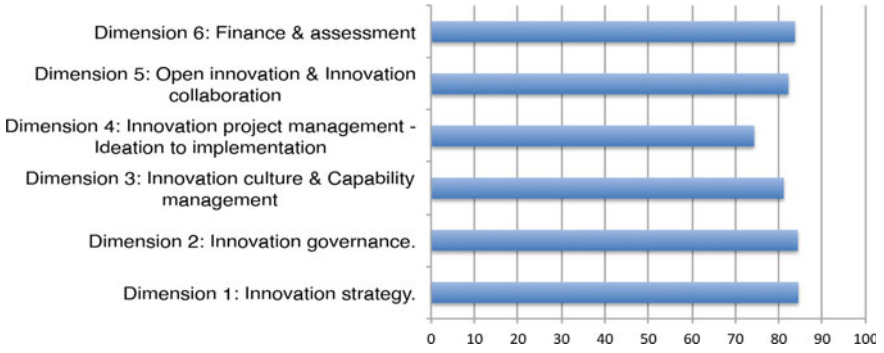


**Fig. 4** IPAT dimensional results

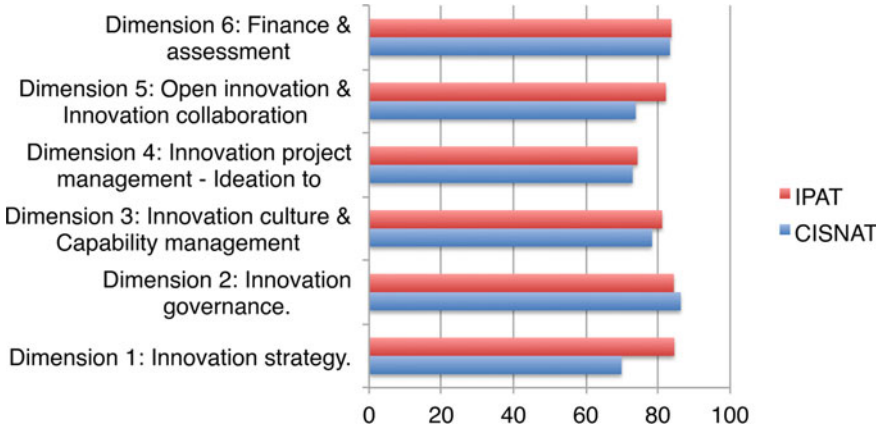


**Fig. 5** CISNAT-IPAT dimensional result comparison

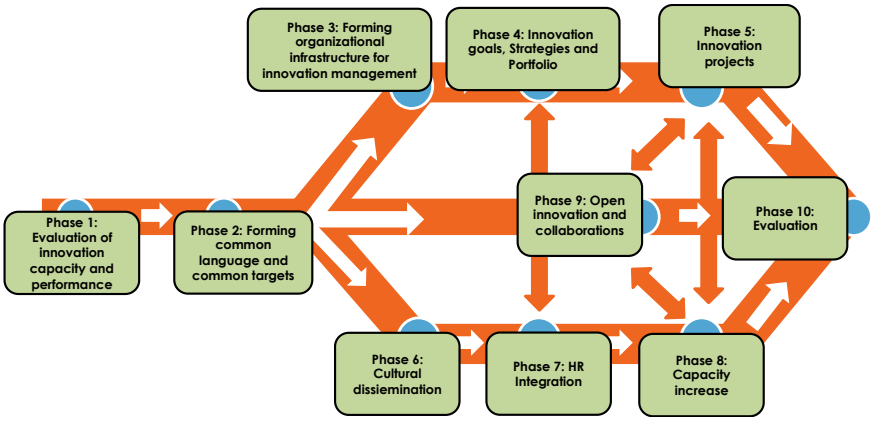


**Fig. 6** CIS implementation phases

the published report (İnosuit Program Etki Analizi, 2020). The overall results from the participants show that in terms of the 20 targets, an overall 80% completion is achieved among the companies of the program. Other findings related to each target require further discussions, but since the focus of this chapter is on the CIS model description, we shall provide worthwhile results. Target number 2, which is "Designing an organization-specific corporate innovation system," has the highest score (4.63 out of 5) with a minimum standard deviation (0.616), whereas the lowest score (3.67) is found to be target number 11 (Integration of Innovation to HR Applications of the Organizations). The second highest score (4.74) is "Designing an Idea and Suggestion Sharing System," and whereas the second lowest score (3.75) is Designing Intellectual Property Rights Procedures. The other lower score targets are Utilizing External Finance Sources and Funds for Innovation, Designing Open Innovation Processes and External Stakeholders Collaborations, and Preparation of the Institution's Technology Roadmap and Capability Roadmap. Additionally, the Kaiser–Meyer–Olkin (KMO) and Bartlett tests were performed. The association of the six dimensions of the model and the 20 targets is analyzed with respect to model accuracy. The accuracy of the model was further confirmed by showing that its explanatory power was high at 0.74.

## 6 Conclusion

Innovation management requires a holistic approach that involves interactive, strategy-oriented, sustainable processes and structure. Corporate innovation systems that allow the reflection of organizational differences are paramount to benefit from the value created through innovation in the rapidly increasing competition environment. While innovation management models in the literature do not provide a

roadmap to establish a corporate innovation system, we propose a semi-structured model and its elements with a roadmap to develop and improve innovation systems for businesses. In addition, the proposed model incorporates both top-down and bottom-up perspective evaluations to provide a complete analysis of the company, resulting in a better-suited roadmap for innovation management.

The semistructure corporate innovation system model provides some unique features that ensure forming a sustainable innovation performance within the company by having the following features:

- *Capacity and perception measurement* that allows us to organize, plan, and make decisions
- *Cultural development* through enhancing the ability to manage group dynamics and communication
- *Integrated system* that allows managing uncertainties and conflicts
- *Semi-structured approach* that provides flexibility
- *Custom-made implementation*
- *Talent and capacity development* by focusing on creativity, critical thinking, and a design mindset
- *Learning organization* by promoting the ability to transfer knowledge, sharing, and continuous learning
- *Multidimensional approach* that includes compliance and cooperative dimensions
- *Strategic link* that provides conceptual mapping between innovation and platform strategy, technology roadmap, and critical competences.

This model has been successfully implemented in 129 companies as part of a nationwide innovation program. The fact that participating companies came in various sizes demonstrates the robustness of the model. Companies that have successfully finished the nationwide program were responsible for completing the processes of the proposed model for a certain period under the supervision of a mentor. In addition, the impact analysis performed for 57 of these companies shows that the overall 80% completion is achieved based on the 20 targets specified in the model.

The model provides a roadmap for companies to establish a corporate innovation system that will ensure the spread of innovation climate in the organizations. Besides, the model sheds light on the practitioners as to where and how to start innovation management in institutions and which functions should be integrated. Therefore, it is thought that the model, which gives guidance on which targets should be achieved to create a successful innovation system, creates value for the practitioners.

Nonetheless, the study has limitations. The model has been applied to nationwide programs. However, some companies where the model was applied are multinational. This proves that the international differences of the model do not have a negative effect on the implementation of the model.

One of the important ideas for further research is to explore the network effect in the organization. Initial findings suggest that participating companies, following the same model, aiming at the same targets even though detailed planning may differ, create a common language. This forms a support network among the companies. This network is further enhanced by periodical meetings with the participants to share

experiences and problems in order to develop the best solutions. One can consider applying the proposed model to other nationwide innovation-focused programs in other geographies. Further research is needed to articulate the proposed CIS model in a specific organizational context in which the characteristics of the organization can be a subject matter for adapting the model. For this purpose, the action research method will be suggested as an effective way of examining the rich context of the model adaptation.

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