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Chapter 2

The KES-MI Project

Fritz Böhle, Markus Bürgermeister, and Stephanie Porschen

KES-MI stands for “artistic, experience-based, playful – management of the informal promoting innovative work”. The KES-MI project investigated methods that allow for uncertainties and indefiniteness of innovations when managing innovations and using them strategically as potential for promoting the innovation capacity of companies. Not only theoretical and empirical research should be performed in this respect, but suitable models for management of innovations should be developed and tested in practice.¹

The KES-MI project focuses especially on work when it comes to innovation and the role of informal processes when managing innovations. Both aspects are hardly accounted for in the predominant concepts of innovation management; for the most part this concerns blind spots. Considerable potentials, which have hardly been used to date for promoting innovations in companies can, however, be found in this area. The conceptual framework of the KES-MI project will first be described in greater detail below followed by an overview of the results presented in the following chapters.

¹ See the note in the preface for the scientific institutions and companies that participated in the KES-MI project.

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2.1 Conceptual Basics

Broad understanding of innovation: The KES-MI project is based on a broad understanding of innovations. It refers to different subject areas. This results in product innovations, process innovations and organizational and social innovations being able to take place in all company areas and being necessary for the development of companies (cf. Chap. 4). Furthermore, innovations occur both within and across companies in cooperation with external service providing and research institutes, other companies and customers (cf. Chap. 5). Finally, innovations are not only brought about in certain departments like research and development or certain professional groups like engineers, but essentially in all company departments and by all employees (cf. Chaps. 3 and 7). Using and promoting the ability to innovate on the part of all employees is particularly necessary in small and medium-sized businesses as virtually no innovation centers exist or are possible in such companies (cf. Tintelnot 1999; Ridolfo 2005).

Innovation work: When it comes to the question as to what influence the human factor has on innovation, the focus is mainly on the personality characteristics, which promote innovation and creativity. The specific action of employees, who actually innovate, is hardly considered in this respect or only in a generalized or superficial manner (cf. Chap. 3). The activity of specialists with a technical background in natural sciences is considered typical for innovation work in research and development. This work is traditionally referred to as “intellectual” work and is referred to as “knowledge work” following recent developments. Contrary to the theories of the knowledge-based society, which claim to replace work with knowledge (e.g. Willke 1998, p. 161; Miegel 2001, p. 209), the term knowledge work at least refers to the fact that knowledge has to be generated and applied in a practical manner and that work is required to achieve this. At the same time, the idea that work exclusively focuses on dealing with abstract symbols and intangible circumstances is associated with the term knowledge work (cf. Reich 2000).

When it comes to innovations within companies, however, particularly dealing with tangible circumstances plays an important role with respect to technical and organizational developments. This is especially the case when it comes to innovation work outside separate research and development departments. The term “intellectual” work or “knowledge work” is also associated with the idea that knowledge based on science is applied and a planned-rational approach to action is taken or is at least predominant and should be achieved to the greatest extent possible. However, fundamental aspects of work related to innovations are neglected in this respect. Just as innovation as a whole, innovation work is also characterized by a high degree of uncertainty and indefiniteness. This concerns goals and results as well as methods of achieving them. Action concepts are needed in order to assess innovation work, which indicate how it is possible to achieve goals without the goals themselves and approaches have been decided upon and defined ex ante. In the KES-MI project, three approaches to action have been

considered, which particularly address dealing with uncertainty and indefiniteness and are associated with one another and specified in relation to innovation work: the concept of artistic, experience-based-subjectifying and playful action (cf. Chaps. 3, 5, 6 and 7).

Innovation process: If one considers innovation work, the question is raised both regarding the nature of work as well as the specific content of innovation work. This can be systematically determined in relation to the innovation object (product, process, organizational, social) and different sub-processes of innovations. The latter refers to the fact that the content of innovation work depends on when the work takes place within the innovation process and which requirements are actually in place here. The research and development work of engineers considered to be typical for innovation work relates to an important and yet limited sub-process within the innovation process as a whole. Systematic determination of the innovation origin and start of innovation projects is therefore underexposed. Practical realization of the results of research and development in production and also with respect to market introduction or implementation within the company is left out for the most part. In a narrow sense, the innovation term therefore directly relates to the exploitation of the invention (cf. Brockhoff 1999, p. 35 et seqq.).

Overall, a broad understanding of innovation is therefore needed (cf. Brockhoff 1999, p. 38 et seqq.) in order to determine what the content of innovation work really is (cf. Chap. 4). Classical concepts for systemizing the innovation process have shown themselves to be inadequate with respect to the above aspects. They neglect significant constituents of the innovation process or fail to differentiate the process. They are also too linear and rigid when it comes to uncertainty and indefiniteness of innovations (cf. Trott 2008; van der Duin and den Hartigh 2007). On the other hand, an extended concept of the innovation process was developed in the KES-MI project, which particularly relates to uncertainty and indefiniteness of innovations and systematically allocates the role of innovation work to different sub-processes (cf. Chap. 4).

Management of the informal: In innovation research and to an increasing degree in practical application, there is widespread consensus that hierarchical structures and bureaucratic rules hamper innovation. Decentralization and self-control on the part of employees are now considered important prerequisites for enabling and supporting work when it comes to innovation (cf. Gärtner and Lederle 2006). In the past, work forms of this kind often developed in the scope of practical work by research and development departments beyond the scope of tayloristic rationalization of work in other company areas (cf. Chap. 1); following recent developments, work forms of this kind have received special support and further dissemination through the propagation and realization of post-tayloristic work organization. Simplification of bureaucratic decision-making channels and strengthening of individual responsibility are particularly associated with the above (Kotthoff 1997; Kotthoff and Wagner 2008).

Decentralization, individual responsibility and self-control are necessary, but in no way adequate prerequisites for innovation work. As apparent in practice, new control and management instruments, which aim to make action resulting from

individual responsibility as transparent, understandable and verifiable “from the outside” as possible, are being utilized to an increasing degree in companies. They range from the obligation to document and orient oneself towards key figures, target agreements and formal quality management methods up to and including coordination in formally regulated boards and meetings (cf. Böhle et al. 2011; Bolte et al. 2008).

The principles and instruments of planning-oriented innovation management (cf. Sect. 1.3) are also geared towards ensuring the transparency and verifiability of innovation work. However, dealing with uncertainties and indefiniteness within the innovation process in particular requires not only leeway for action on one’s own responsibility, but also the possibility of informal, situational action, which cannot be described and assessed using methods capable of being formalized. In addition to knowledge explicitly founded in science, there is also experiential knowledge, which is acquired through practice, can only be made explicit to a limited extent and is an imperative knowledge resource (Rüdiger and Vanini 1998; Brodbeck 1999; Mildenerger 2006). Informal aspects not only represent “divergence” from methods that can be formalized in this respect as they are not just aspects, which have just “not yet” been formalized. The decisive work practices and processes instead have their own structure, which is not accessible for formalization or only to a limited extent (cf. Böhle and Bolte 2002). The same also applies for experiential knowledge. To a large extent, this is implied knowledge, which cannot be transformed into explicit knowledge.² This does not rule out the fact that implicit knowledge can be communicated. However, special forms of representation and exchange are needed for this (Porschen 2008). The inability of informal practices and processes to be formalized also does not lead to such practices and processes being removed from the organization and management. However, forms of organization and management are required, which do not transform informal aspects into methods and flows that can be formalized, but instead which enable and support it. Organizational basic conditions and opportunity structures are an example of this, which enable informal cooperation and coordination of current work independent from formally regulated procedures and meetings (cf. Bolte and Porschen 2006). The concept “Management of the informal” addresses this. In the KES-MI project, three design approaches for innovation management based on management of the informal were researched and developed: situational project management, the cooperative transfer of experience in agile development processes and decision-making during active work (cf. Chaps. 5, 6 and 7).

Development of competences for innovation work: The understanding of innovation work as “intellectual work” and “knowledge work” is also associated with the idea that a formal and particularly academic education is necessary for this.

²The term implicit knowledge has recently been used in knowledge management as a result of recent developments. However, this assumes that such knowledge can be made explicit (e.g. Nonaka and Takeuchi 1997). In contrast to this regarding the limits of explicability of implied knowledge and experiential knowledge Neuweg (1999) and Böhle (2009).

However, such education conveys neither fundamental competences, which are required for innovation work nor can such competences be acquired by taking such an approach. Particularly the artistic, experience-based and playful elements of innovation work require learning in the course of and as the result of practical action (cf. Chap. 8). One therefore has to learn within the innovation process itself and have corresponding possibilities to learn. Learning of this kind is essentially based on self-directed informal learning. However, it would (also) be a mistake to consider this to be the opposite of special organization and promotion of learning. Instead, it is necessary to promote self-directed informal learning within the work process and to create corresponding learning arrangements and working conditions and environments that promote learning (cf. Bauer et al. 2004). Drawing on concepts for promoting informal learning, which have already been developed and tested, principles of work designs and work environments related to practice and for promoting learning were developed especially for innovation work within the KES-MI project (Chap. 8).

Controlling: Controlling is continually gaining importance in the scope of innovation management. Classic principles of controlling suggest that activities that can be planned and innovation effects that can be measured in a relatively accurate manner should be considered first (cf. Bürgermeister and Habler 2010; Holtrup and Littkemann 2005). Important information, often of a fundamental character, can no doubt be acquired in this way. It is therefore undisputed that orientation towards activities that can be planned and innovation effects that can be measured in a relatively accurate manner contributes to reliable innovation controlling and goal-oriented innovation management. However, if this is the only orientation point, there is the risk that the success and the cause of success of innovation are evaluated in an unrealistic manner (cf. Bürgermeister and Habler 2010).

Controlling particularly benefits planning-oriented innovation management in this way. It therefore follows that orienting oneself with the greatest possible level of planning and reducing uncertainty is a necessary prerequisite not only for controlling innovation processes, but also being able to evaluate and monitor them economically. However, this is a mistake similar to the assumption that considering and accepting informal processes generally contradicts organization and management of improvisation processes. A controlling concept was therefore developed in the KES-MI project that addresses the limits of planning and supplements evaluation of innovation effects, which can be measured in a relatively accurate manner, in a systematic manner with innovation characteristics, which are more difficult to grasp structurally. In the process, the controlling concept developed also addresses the strengthening of reliability in the evaluation of activities that can be planned and innovation effects that can be measured in a relatively accurate manner (Chap. 9).

Figure 2.1 provides an overview of the conceptual framework of the KES-MI project.

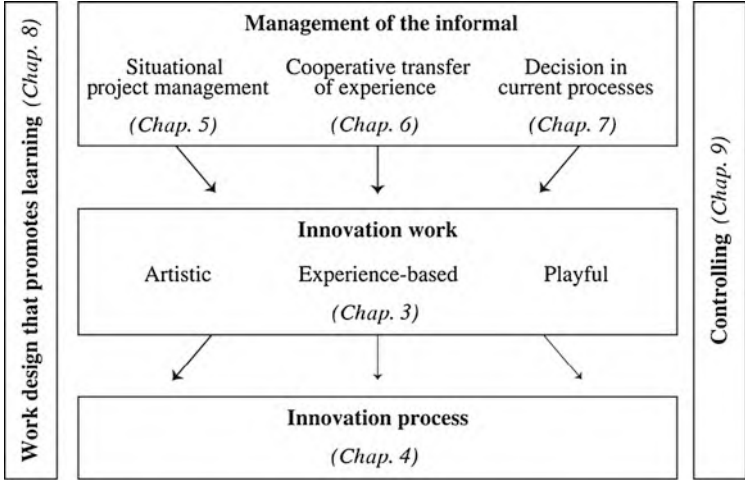


Fig. 2.1 Overview of the conceptual framework of the KES-MI project

2.2 Area of Investigation

The empirical investigations performed in the KES-MI project on innovation work and innovation processes as well as the development and testing of management of the informal focused on the companies involved in the research project. Different sub-processes and company departments, subject areas and employment groups were considered with the innovations as well as intra-company and cross-company innovation processes.

Sub-processes and company departments: The following were considered with respect to the different sub-processes within the innovation process (cf. Chap. 4): Research, development, production and introduction to the market (Chap. 5), development, production and introduction to the market (Chap. 6) and production (Chap. 7). In the discussion to date uncertainty and limits of planning are most often restricted to the phase, during which innovations emerge, that is, the invention. In the KES-MI project, uncertainty and limits of planning are given particular consideration in the subsequent innovation sub-processes.

Employee groups: Innovation work is the core task of employee activities in two companies. This is the case with engineers, technicians and physicists (Chap. 5) as well as engineers, technicians, computer scientists and physicists (Chaps. 5 and 6). The innovation work investigated and designed in one company is additional work encountered in practice, but which is hardly considered in the explicit and official definition of the work task. This particularly applies for employees in production (Chap. 7).

Subject areas: The innovation processes in the companies mainly address technical product innovation (Chap. 5), technical and organizational process innovation (Chap. 6) and organizational process innovation (Chap. 7).

Role of customers: In one company, the focus is on intra-company innovation processes. However, important impulses for innovations result from in part close contact to customers via sales (cf. Chap. 7). In the two other companies, there is close contact to customers in the innovation process. In the one case, the impulse for innovation is provided by the need of a customer, who is also integrated in the innovation process later on. There are also contacts to technical institutes etc. (cf. Chap. 5). In the other case, innovations occur directly at the customer's location (cf. Chap. 6).

2.3 Overview of Results

The results of the KES-MI project will be presented in the following chapters. In addition to the information provided above, here is a brief overview.

Chapter 3 focuses on innovation work and presents a general model for work action during innovation work. Fritz Böhle, Karin Orle and Jost Wagner show that innovation work differs from other work that focuses on the use of known methods and the realization of known goals. Compared to the model of planned-rational action, there are, with respect to innovation work, key differences in the necessary subjective attitude one takes when performing innovation work, the method of action and the definition of the situation, where action is taking place.

Innovation work requires an artistic attitude characterized by openness. This means being prepared to commit to an open process without knowing exactly where this process leads and what the result will be. This is what (first) makes it possible for inspiration for new solutions to emerge in the process of practical action and for them to be perceived and utilized. This is also associated with the willingness and ability to accept and withstand crises up to and including failure. Finally, artistic attitude is based on an inner connection of the person acting with the content and object of action. The action being performed always also embodies one's personal interest and personal expression. It is therefore not enough to merely act based on an outside reason or order.

The method of action and consequently the question as to how the task or problem are approached and solved does not follow the principle: decide/plan first and then act practically. Instead, innovation work requires an explorative and discovery-based approach, where goals and approaches are first investigated and defined during and by means of practical action. As a result, one does not influence the environment in a one-sided manner, but determines more through dialog and interaction with "things" which requirements exist and how they can be addressed. Sensory perception is necessary for this, which is directed not only at information, which is clear and can be determined exactly, but which also perceives complex, diffuse properties and behaviors of specific circumstances and utilizes them as important information sources. Having a feeling for potential results and paths, which are not yet known and which have not yet been realized, but have a practical aspect, is characteristic in this respect. In addition to analytical thinking and logical

conclusions, imaginations and associations for achieving the desired result play an important role with respect to an explorative and discovery-based approach.

Although innovation work normally occurs in the context of gainful employment, one has to ignore economical and purposeful requirements and compulsions associated with such employment on a situational level. Orienting oneself with the game provides a helpful social framework in this respect. It makes it possible to realize a purpose without being aware of it and endeavoring to achieve purpose through specific action. Furthermore, perception and definition of the work situation as a game during innovation work offers the possibility of high subjective involvement (flow) and taking potential risks up to and including failure. Finally, in accordance with the rules of the game, established methods and knowledge do not act as a restriction or compulsion, but as a basis for open, self-determined action.

The general model developed in Chap. 3 is described in greater empirical detail in the following chapters with respect to different forms and subject areas of innovation work.

The concept of a flexible, open and non-linear innovation process is the subject of Chap. 4. Markus Bürgermeister presents the KES-MI innovation process in this respect – based on uncertainty as a constitutive characteristic of innovation and in special consideration of artistic, experience-based and playful innovation work. The flexibility of the innovation process thereby becomes apparent in two respects: in the flexibility between the individual elements and in the flexibility within elements. Planning and calculation are not surrendered in the process because they are without a doubt important for innovation. Standardized processes are utilized consciously and not negated per se, but are not allowed to impair the emergence of artistic, experience-based and playful innovation work as a whole. Based on the work of Brockhoff (1999) and Moritz (2008), the KES-MI innovation process consists of the following elements: Impulse, pool of ideas, selection and initiation, research, development, production, introduction to the market/the company and establishment on the market/in the company. With respect to unplanned aspects, these elements are not rigidly allocated in a sequential flow chart, but can be combined flexibly, which is illustrated in Chap. 4 on the basis of several examples. The flexibility of the KES-MI innovation process within the individual elements is also illustrated subsequently, whereupon artistic, experience-based and playful innovation work is systematically considered in individual fields of application.

In Chap. 5, Eckhard Heidling deals with innovation work in networked structures using the example of an innovative company in the field of measurement and control technology. His contribution first outlines the current discussion surrounding cross-company project structures. Then, Eckhard Heidling addresses the project work typical for innovation processes and focuses on actual realization within suitable structures. For the company, he describes the facets of artistic, experience-based and playful innovation work with demanding research and development tasks, which are realized in cooperation with large industry and research institutes from the region. The work processes are characterized by a high level of

openness when dealing with different theoretical and practical approaches to solutions, experience-based communication that addresses the object and playful elements with respect to the application of the experimental methods. It is shown how this innovation work can be “managed informally” in the scope of situational project management. An important aspect of situational project management lies in that planning deficits are not considered a special case, but a normal one and are utilized in a productive manner. Important components of situational project management in the dimensions of goal definition, scheduling, the type of approach and type of management are developed.

Stephanie Porschen explores the unique aspects of innovation work in Chap. 6 on the basis of agile software development for technical systems, so-called “embedded systems”. The exchange of both explicit and implicit knowledge, which is essential in innovation processes, is of key importance. The properties of innovation work must be accounted for at the same time: They are apparent for example in personal expression, which is reflected in the aesthetics of a program or resilience in the face of setbacks with respect to imponderable events and “allowing to gain experience” instead of indoctrination. There are numerous starting points for management of the informal. It is shown to which extent methods of agile (software) development can be utilized or expanded to promote innovation work. The author also provides background information in this respect. Overall, new approaches for the exchange of knowledge closely related to work processes are identified as well as bases for flexible goal definitions and planning methods are developed, where “playful” elements are included. The chapter also addresses demands with respect to the accompaniment of such processes when they are suggested for long term application. The manner in which management of the informal presented here can be conveyed to various contexts by means of cooperative transfer of experience is also described here.

Innovation work and its design are not only a topic of development and realization work by engineers, as Judith Neumer describes in Chap. 7, executing production is also a place and source of innovation. Decisions must be made continually in this area as to which methods are indeed the best when it comes to the realization itself; workplaces and processes must be designed and adapted accordingly in this respect. Employees on location are the experts in this area and bring about changes and improvements, generally speaking, not through planned, but experience-based activity by e.g. building prototypes and explaining the improvement in the presence of the object or contributing prompt estimates relating to fitness for use on the basis of their experiential knowledge. Production as a place for innovation is, however, also associated with an artistic attitude, which particularly requires a change of perspective. Whether through interdepartmental cooperation with other manufacturing departments or employee visits from purchasing, sales or the technical office – details can be considered in their specific environment from a variety of perspectives and made tangible. Employees from the production company presented in Chap. 7 address this as well as the possibility of “juggling” resulting ideas within a protected space as a group. Judith Neumer points out, that the provision of protected space is required for this and that opportunity structures are needed in order to try things out and for

informal cooperation and communication with the purpose of refining ideas. This management of the informal is associated with recognition of the experiential knowledge of employees and the special management task of reconciling planning and practice. A culture based on trust that goes beyond paying lip service is the basis of innovations based closely on products and processes.

In Chap. 8, Hans Bauer, Christiane Hemmer-Schanze, Claudia Munz and Jost Wagner describe how one can learn the innovation action clarified in the case studies. The authors discuss complex questions associated with acquiring competences through learning, associated aspects of a methodic-didactic nature and boundary conditions that promote learning. The starting point in this respect is moving away from “dominance learning” that is purely cognitive and merely relays knowledge. There is, however, no simple reference to the term competence, which promises known forms for dealing with a postulated innovation competence. Instead, the special abilities of artistic, experience-based, playful innovation work, which may be decisive for action in innovational situations requiring action, are more in focus. Own forces of acquisition are required for them. The staying power required for difficult open situations or productive approach to dealing with conflicts when confronted with disturbances and errors must be part of the curriculum as well as trust in solutions, which are first encountered in the process. This can only occur in practice, which must, however, be designed and accompanied. Learners need opportunities to actively realize artistic, experience-based and playful forms of action themselves in consciously designed learning arrangements, learning processes and suitable situations requiring action. Leeway with certain technical, organizational and personal conditions is necessary for this. Prerequisites associated with individual learning for the further development of competences are also presented in greater detail. All in all, the analogy between innovative work action, which cannot be completely controlled, and competence-oriented learning becomes clear. Both aspects require courage to deal with openness, uncertainty and risk.

The main concern of Chap. 9, the final chapter, is reinforcing the reliability of controlling of innovation. Markus Bürgermeister presents the concept of balanced innovation management accounting in this respect, which was developed in the KES-MI project. The concept involves reliable evaluation and planning within the innovation process. Reliable identification and evaluation of activities that can be planned are emphasized as are innovation effects, which can be measured in a relatively accurate manner. “Soft” innovation effects, artistic, experience-based and playful innovation work and informal, flexible organization of innovation work are also equally considered. With respect to the limits of what can be planned, which today are encountered to an increasing degree in the innovation process, planning and the current situation often do not match to a sufficient degree. It therefore makes sense to consider planning and evaluation as independent controlling instruments. Evaluation and planning are plausible at any point of the innovation process in the scope of the controlling concept, which was developed. To the extent sensible and possible on a personnel level, controllers are supported in evaluation and planning tasks by measurement experts, statisticians and managers, employees as well as external partners, who factually deal with the applicable innovations

(cf. Littkemann 2005, p. 270 et seq.). The balanced evaluation innovation scorecard and the balanced planning innovation scorecard form a framework for evaluation and planning. Drawing on the concept of the balanced scorecard (Kaplan and Norton 1996, 2001), the following scorecard dimensions are suggested in this respect: Innovation object, innovation customers, innovation potential and innovation finances. This concept will be explored in greater detail with particular regard to the dimension of innovation finances as the calculated financial innovation success is often of particular interest to the external and internal accounting.

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