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The project-oriented organization and its contribution to innovation

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Abstract

This paper presents a new conceptualization of the project-oriented organization. The project-oriented organization is conceptualized as an entrepreneurial, future- and stakeholder-oriented innovating organization, which uses projects as temporary, task-focused organizations, to define, develop, and implement its strategies, to transform its structure, culture and behavior, and to define and develop new products, services, and business models. The concept of the project-oriented organization consists of the three segments (1) values, (2) structures, and (3) people. For each segment three important areas are described, which characterize a project-oriented organization. The model is theoretically based on a wide spectrum of management disciplines: (1) The orientations in the value segment have been developed in entrepreneurship, strategic management and technology and innovation management; (2) The foundations for the design of the socio-technical artefacts in the structure segment of derived from organizational design, planning and controlling, and ICT systems theory; (3) The foundations for the elements of the human side come from organizational behavior, human resource management, and knowledge management theories. Our model shows a clear linkage to these theories, references key articles, and gives special consideration to empirical studies in the realm of projects, programs, project portfolios, and project-based or project-oriented organizations. Thus, our assumption that the elements of our model are supposed to increase project success, innovation success, and business success is based on empirical evidence.
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1. Executive summary

In Germany's manufacturing industries, 46% of sales in 2013 were generated by commissioned external projects (Wald et al., 2015b). Personnel expenses for projects reached 41% of their sales. The same study showed: The share of work-time in a firm spent on projects correlates positively with the innovation success of a firm, and the innovation success correlates positively with the business success of a firm. However, the share of work-time does *not* correlate significantly with the business success. *What is different with innovation leaders? Why and how do innovative projects increase business success?*

The model developed in this article allows a systematic analysis.

(1) Innovation leaders build better *structures and processes* for project portfolio management, which give them a higher transparency, allow them to more clearly recognize opportunities and threats, as well as the available and required resources to pursue their project options.

(2) Innovation leaders are more future-oriented and pro-active. Therefore, they lay more stress on the *front end* of their innovation pipeline and use a variety of methods to generate better and more ideas, and processes how to select the best ones. Thus, they can choose among higher valued projects with more mature and better tested business plans.

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(3) Innovation leaders are more *people-oriented*—on average they reach a higher level of maturity and professionalization in leadership, teamwork, and bespoken HRM- and knowledge management systems, which fit the needs of project management. Finally, innovation leaders are more open to voice behavior by their project managers, they recognize the opportunities for change, and take them as impulses for potential *emerging* strategic options.

(4) The *impact* of the measures to create strategic and operative clarity is higher for innovation leaders, because they respond more quickly and more consequently to the information they receive. They are more responsive to react upon unexpected risks and opportunities, and they do this more consequently.

(5) The project managers and team members are more motivated and experienced in executing highly innovative projects and in coping with more ambiguity. They embrace uncertainty as an opportunity and experience unknown solution paths as a positive challenge and use other practices, which fit to such projects. Their team members have a preference for a higher autonomy, more shared leadership and self-management, and a greater fluidity and variability of knowledge and skills.

2. Introduction

Projects and innovations are ubiquitous in our professional and private life—we live in a project society (Lundin et al., 2015) and in an innovation society (Rammert et al., 2015). For example, the share of work-time spent in projects has increased in Germany from 29.3% in 2009 to 34.7% in 2013, and it is expected to grow to 41.3% in 2019 (Wald et al., 2015a, Fig. 5, p. 31.). Projects have become a ubiquitous means of organizing work not only within industrial firms (Midler, 1995) and professional sectors—such as research, education, health care, culture, sports, politics and public administration—rather the methods of project management are also used in our private life. An implication of this trend is that we spend more time in projects and that more value is created or destroyed by projects (Schoper et al., 2016).

Wald et al. (2015b, p. 27) report an interesting finding: The share of work-time of a firm spent in projects correlates positively with the innovation success of a firm, and the innovation success correlates positively with the business success of a firm. However, the share of work-time does *not* correlate significantly with the business success. This finding shows that the relationship between project organizing, innovation and business success is not an easy one, and we need to specify which type of project-oriented organization we investigate. Obviously, some organizations use projects to develop innovations and are successful in doing this, whereas others do not use projects for this purpose, or they are not successful in doing this. For organizations of the first group we may expect that a causal chain increasing project intensity and maturity leads to higher innovation success, which in turn leads to a higher business success. *We are interested in this first group, and we want to develop an organizational model that improves our understanding of how and why project-oriented organizations contribute to a higher innovation and business success.*

Many contributions in the project management literature focus on firms, which offer complex and individualized solutions for their customers that get contracted before the development, construction and delivery starts. In these firms, projects are the form to organize their operations. They may deliver innovative products, but this is not the distinguishing characteristic of these firms. These *project-based organizations* are project-based *perforce* because of the customized nature of the demand from its customers (Turner and Keegan, 2001). On the other hand, the *project-oriented organization* is such by strategic choice, based on the organizational strategy of Management by Projects (Huemann, 2014).

Our contribution aims at the project-oriented organization, more specifically at organizations that organize their *innovation function* by means of projects, programs, and portfolios of projects. Although such firms create an increasing share of value in our economy, they have not yet been analyzed as project-oriented firms. We already have several contributions how innovative projects and portfolios of them should be organized, and which features a successfully innovating firm should possess, but we lack a coherent conceptual model. *The design of such an innovating project-oriented organization is the focus of this paper.*

The three parts of our model of the innovative project-oriented organization (*structures, people, and values)* are derived from three sources: (1) a literature review of project and innovation management, (2) an unpublished longitudinal multi-case study showing how organizations have become more project-oriented, and (3) the collective findings from seven quantitative multi-project management studies, which have revealed features of a project-oriented organization that distinguish successful and innovative ones from the rest. Together these studies have analyzed more than 1200 project portfolios in various industries and countries. Data of these multi-informant, multi-level studies was gathered from more than 3000 respondents who answered to more than 700,000 questions. The project portfolios covered more than 100,000 projects and more than 120 billion Euros budget.

3. Project-based and project-oriented organization

Several attempts have been made to conceptualize project-based organizations. We concentrate on the more influential ones, and give more weight on conceptualizations that try to explain innovation success.

The organizational model of a project-based organization designed by *Hobday (2000)* was based on research about *innovation of complex product systems* (Hobday, 1998). Such systems are characterized by a *singularity* of goals and outcomes (Whitley, 2006). The innovative solution is offered to a major client by a network of supplier organizations and the delivery is based on a web of coordinated contracts. According to Hobday (2000, p. 871), the *project-based organization* "is able to cope with emerging properties in production and respond flexibly to changing client needs. It is also effective at integrating different types of knowledge and skill and coping with the project risks and

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uncertainties." The capability to create new organizational structures around the demands of each complex product systems enables a network of firms to manage very complex and unique demands and their uncertainties and risks. If the developed system offers *new* functionalities, enabled by *new* technologies, such a capability may indeed foster a better design, production and delivery of very *innovative* complex systems. However, this organizational model of a project-based organization will only lead to successful innovative solutions, if both customer and supplier share the goal that a high degree of innovativeness should be achieved, and if they establish a close collaboration that fits to this goal and supports learning and coping with conflicting interests. In many cases customers and sellers of major infrastructure projects are conservative and try to avoid too much innovation, in order to reduce the risk of their mega-project. If strong pressures on time and cost exist, the relationships between the parties may become adversarial. Although the project results have a long intended lifespan and strongly impact the long-term future, the delivering organization may behave opportunistically, following short-term goals (Winch, 2014; Winch and Leiringer, 2016). Thus, although the design and delivery of a complex product system may offer a multitude of innovation opportunities (Davies and Hobday, 2005), and the project-based organizational model may enhance the delivery of complex innovative product systems, it is not guaranteed that these will we be exploited.

A major characteristic of Hobday's concept is that a complex product system is offered to one single customer by a network of contractors, which have to adapt flexibly to the customer and to each other. Thus, a specific kind of market organization is linked with this organizational concept, and this applies also to the *project business* tradition, which considers specific industry contexts (Artto and Wikström, 2005; Artto et al., 2016). However, if we look at the firms with the highest market capitalization at the end of 2016 Apple, Alphabet, Microsoft, Amazon, Exxon, Johnson & Johnson, Facebook, JP Morgan Chase Co., General Electric and Wells Fargo, then several of them run very complex projects in order to develop or improve their owned hardware and software systems, which allow them to offer products and services for many hundred millions of customers, but most of them are not organized as project-based organizations sensu Hobday. Several of them are very successful innovators, which have implemented completely new business models and services, and they run a powerful portfolio of innovative projects, to stay successful in the future. Their end products and services are often easy to use, and are accessible nearly everywhere and every day. The high usability of their products and services is not only granted by specifically designed functions and production processes, it also often backed by huge computerized systems. Companies like Amazon are the developers *and* operators of such systems, which offer their services to many end-users. There is no market interaction needed between a consortium of suppliers and a private or public utility organization, which runs the services. It is all integrated within one large firm—and this firm can of course selectively use innovative suppliers, to deliver innovative components, but it does not depend on them. Thus, the model of Hobday is *not* a general model for the organization of innovative complex product systems, it is a model, which is important and applies to variety of industries, but there are *competing* models, which are also successful.

Whitley (2006, p. 80) describes the *heterogeneity* of project-based firms and develops an ideal typology of four kinds of project-based organizations using the two criteria (1) Singularity of goals and outputs, and (2) Distinctiveness and stability of work roles, professional identities, and skills. Combining both criteria gives four ideal types.

(1) The *hollow or contractual PBF*, combines a focus on one or a small number of different kinds of projects with a reliance on relatively distinct and stable skills and work roles. The types of knowledge and expertise required are here fairly predictable and can be decided in advance.
(2) *Craft PBFs* are multiple project firms carrying out a number of similar projects with relatively stable and codified skills that structure the definition and allocation of tasks. They produce multiple, incrementally related outputs. Innovation is typically incremental and client-specific.
(3) *Organizational PBFs* producing multiple and varied outputs with different and changeable skills and roles. The major difference to the first two kinds of PBFs lies in the greater fluidity and variability of knowledge, skills, and the division of labor. Coordination costs are correspondingly greater since skills are only weakly standardized and do not structure work routines to a great extent. This means that cross-project learning has to be more formally organized than in craft PBFs. Organizational PBFs often develop systematic procedures for managing workflows, allocating skills, and monitoring progress. They also sometimes establish formal systems for codifying and storing project team "knowledge" and training staff in the firm's collective expertise.
(4) *Precarious PBFs* produce risky, unusual outputs with varied and changeable skills and roles. Coordination of workflows and knowledge in these kinds of PBFs is usually achieved through project teams in which roles and skills are highly fluid and changeable.

This typology helps us to explain which kind of project-based organizations we focus on. We do not consider the PBFs which deliver one singular output like the hollow PBF or the precarious PBF where the whole organization is organized around one specific output, because the model developed in this article focuses on an organization that delivers multiple projects simultaneously. This means that we exclude one type of a project-based firm, the precarious PBF, which is assumed to deliver highly innovative solutions. However, it is assumed by Whitley (2006) that this organization needs a specific context like e.g. the Silicon Valley. Thus, it is not a project-based organization that should be recommended as a role model for other contexts. Since we focus on innovating organizations we also exclude the craft PBF, which usually delivers incrementally

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innovative solutions. We remain with the *Organizational PBFs,* which are assumed to deliver more innovative solutions.

While the model of Hobday (2000) focuses on very large projects for a single external client, other researchers have observed that many organizations, which deliver to many different clients, perform a *multitude* of projects simultaneously, which prepare future product and service offerings, or which develop and transform organizations to make them more competitive (Turner and Keegan, 2001). Gareis (1989) is the first to use the term *"project-oriented company"* for such companies. The specific feature of such an organization is that "the management of single projects, the management of the network of projects, and the management of the relationships between the company and the single projects are considered" (Gareis, 1989, p. 243). In his publications Gareis (1989, 1990, 1991) describes his early vision. Ten years later *Gareis and Huemann* (2000, p.709) give the following definition of the project-oriented company: "A Project-oriented Organisation is an organisation, which defines 'Management by Projects' as an organisational strategy, applies temporary organisations for the performance of complex processes, manages a project portfolio of different project types, has specific permanent organisations to provide integrative functions, applies a 'New Management Paradigm', has an explicit project management culture, and perceives itself as project-oriented." Such an organization is assumed to foster organizational differentiation and decentralization of management responsibility, quality assurance by project team work and holistic project definitions, goal orientation and personnel development, and organizational learning by projects.

In her recent book on human resource management in the project-oriented organization, Huemann (2015) gives an overview on the theoretical foundations and characteristics of the project-oriented organization. In particular, among the five organizational types suggested by *Mintzberg* (1979, 1983) the "adhocracy" comes closest to the project-oriented organization. Mintzberg differentiates the operating adhocracy and the administrative adhocracy. The operating adhocracy solves problems for its external clients, focusing on contracted project work. The administrative adhocracy performs projects for internal clients.

Our own model builds on this work of Mintzberg, Gareis and Huemann. We share their view that the distinctive characteristic of a project-oriented organization is not whether it delivers its end products as a project-work, which is contracted with specific customers, as is assumed by most authors. Rather, it is the well reflected decision that a specific business task should be organized as a project, and that a specific temporary organization should be set up to fulfill this task.

4. A new model of the project-oriented organization

The traditional task in project management is to manage individual projects properly, so that the project process is well planned and organized, the team members are well motivated and coordinated, the requirements of the project clients and project suppliers are well met and that they actively perform their duties, and the value creating objectives of the project are achieved for all stakeholders. In contrast, the task of the project-oriented organization is, to lead the organization properly, so that the right projects are carried out, that these projects receive competent project managers and project staff, the project results are used sustainably, and the value creating objectives of all stakeholders of the project-oriented organization are achieved. According to this view, upper and middle managers "are focused on creating the *conditions* to support and foster projects, both in its parent organization and its external environment" (Morris and Geraldi, 2011, p. 20). The linkage between these tasks can be explained with a distinction of three levels of managing projects (1) the *management of single projects*, which is usually called project management, (2) the *management of project landscapes*, which is often equated with project portfolio management, but we prefer to use the wider term *multi-project management*, and (3) the *leadership of the project-oriented organization.* All three tasks have to be managed well, and they need to be aligned and integrated.

The management of a single project is a temporary, specific task, but different solutions have to be chosen for different types of projects (Shenhar, 2001). The management of a project portfolio is a permanent, broader task. Project portfolio management usually considers the human resources that are assigned as given. The development and motivation of human resources, in particular the establishment of a career system for project managers, is typically outside the traditional scope of project portfolio management, but it is an important part of multi-project management. In addition to the development of individual competences, a *learning* project-oriented organization needs to institutionalize knowledge management practices for systematic collective learning. Establishing structures for project portfolio management and addressing the needs of the people working in projects are two important elements of a project-oriented organization. The values, which govern the project-oriented organization, are the third element of our model. Therefore, s*tructures, people, and values* are the three parts of our model of the project-oriented organization. For each of these parts three important components have been developed (see Fig. 1.)

4.1. Structures

A major reason for the emerging project-oriented organization is the fact that firms nowadays run many projects simultaneously. Thus, there is an increasing need to coordinate and control complex project landscapes, in order to align projects to the strategic goals, to pick the winners, to avoid an accumulation of risk, to manage synergies between projects, to adapt to changes, and to provide project teams with sufficient resources and to avoid work overload. This is usually done in *project portfolio management.* The required strategic and operational transparency is established, if processes and structures for project portfolio management are well organized, if planning and control instruments are established professionally, and if both functions are supported by information systems with a high utility and usability. Thus, project portfolio management contains three components: (a) organizing of structures and processes, (b)

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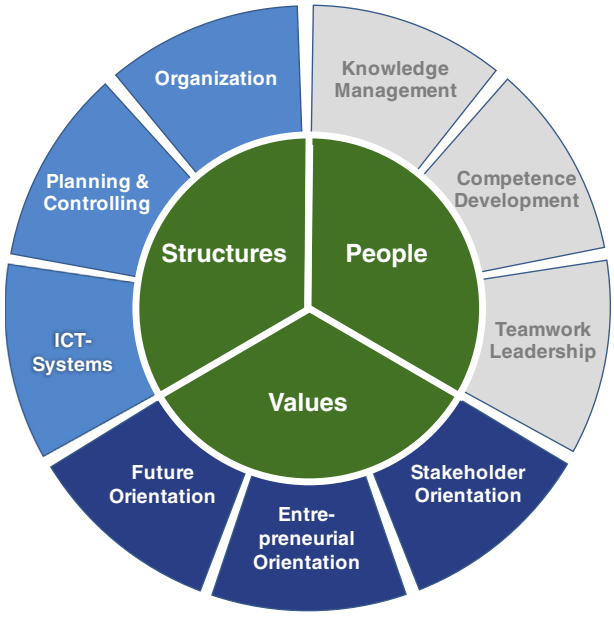


Fig. 1. Model of the project-oriented organization.

planning and controlling, and (c) ICT systems to support decision-making.

(a) *Organization of structures and processes*

Decisions about project portfolios are often made by specific *project portfolio boards.* An organization may have different kinds of portfolios, and establish a portfolio board for each kind, or for different organizational parts, it may also establish higher order boards governing the decisions, which portfolio boards make. Often the work of such a project portfolio board is supported by a *project portfolio management office,* which performs coordinating, planning and controlling, and supportive functions and increases project performance (Unger et al., 2012a). In addition to this, project-oriented organizations may establish *expert units* and *project leader units* (Huemann, 2015, p. 71) People, who often work in projects, thus get a home-base in the permanent organization adapted to their specific needs. They interact more intensively and share knowledge between projects, and they get a project-oriented manager, who takes care of their careers in projects, and supports them if conflicts arise that are typical in project work, or that arise because people are working in several projects simultaneously. The permanent organization has a better overview of its project specialists, and can assign them more easily to projects.

Various studies support the notion that the *formalization of project portfolio processes* significantly influences portfolio performance (Teller et al., 2012). These formal processes introduce structure, sequence, and clarity to all projects. Establishment of clear rules and guiding principles at the decision points lead to data integrity and facilitate the comparison of divergent projects ensuring that processes are comprehensive and responsibilities are well defined. Portfolio process formalization therefore improves information and coordination quality by supporting interactions between different functional groups and projects and facilitating inter-project learning (Prencipe and Tell, 2001). They also enforce strategic fit of project portfolios by project termination (Unger et al., 2012b). The formalization of stages of project portfolio process into project portfolio structuring, resource allocation management, portfolio steering, and exploitation and competence securing has repeatedly shown to increase project portfolio performance (Beringer et al., 2012, 2013; Teller et al., 2012).

The empirical findings also show that project portfolio managers should be more empowered, that senior managers should not take care too much of the operational details in the later process stages, but delegate more authority, and that an integration of all stakeholders also creates value (Beringer et al., 2012, 2013). In addition, a *clearer formalization of roles* also increases performance (Huemann, 2015, pp. 78). In particular, the roles of the project portfolio manager, the mid-level line managers, and the project owners should be clearly defined.

(b) *Planning and controlling*

A project-oriented organization is a future-oriented organization, because projects are intended to improve our future. Such a future-oriented organization requires that the organization develops a well-founded viable *strategy,* which is broken down to the project portfolio level, because a company's strategy is realized by the entirety of its projects (Kopmann et al., 2017). This means that operational criteria are developed, which allow to align the project portfolio with the organizational strategy. Given correct information about the projects and the resource base, this should enable the portfolio boards to prioritize the best projects and to terminate those, which make no sense (Meskendahl, 2010; Unger et al., 2012b). *Strategic*

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clarity is thus the first condition for planning and controlling project portfolios. However, in increasingly turbulent environments it is necessary, but not sufficient to rely on *deliberate strategies.* They need to be complemented by *strategic control* of premises, implementation measures, and unexpected events (Steinmann and Schreyögg 1987) and by *emerging strategies* evolving from real options created by projects, or new threats evolving from crisis projects, and the bundling of such information at the project portfolio level. Kopmann et al. (2017) show that emerging strategies increase project portfolio success, even when holding constant the significant positive influence of deliberate strategies. Both strategic practices are driven by strategic control, and emerging and deliberate strategies also show a significant positive interaction effect.

A second condition for project portfolio success is *operational clarity* about the *projects,* their expected benefits, risks, and resource requirements; the *resources* and their quality and availability. Jonas et al. (2013) present a new construct called *"management quality",* which comprises three facets: cooperation quality, information, quality, and allocation quality. *Cooperation quality* measures the quality of cross-project cooperation between different project managers and project teams. A good cooperation quality between the stakeholders of project portfolios contributes to a sharing of knowledge and increases information quality. The conceptualization of *information quality* is influenced by DeLone and McLean (1992) and Stacie, DeLone and McLean (2008) and comprises relevance, understandability, accuracy, conciseness, completeness, currency, timeliness, and usability of the information, which the decision makers on the portfolio board and the project portfolio manager can access. A high information quality helps to allocate resources better according to value creation, risk and strategic goals, and it speeds up decision-making processes. *Allocation quality* measures the effectiveness, speed, stability, and conflict handling quality of human resource allocation decisions. These three facets capture portfolio management on a meta-level. The focal point is the *quality* rather than the particular *content* of the activities along the process, whereas in the stage model of the project portfolio process, proficiency of *specified* activities, which should take place in certain stages are the main focus (Beringer et al., 2012, 2013; Kock et al., 2015b; Teller et al., 2012). The longitudinal study from Jonas et al. (2013) documents that *management quality* has a strong influence on the success of project portfolio two years later, holding constant project portfolio process formalization.

Clarity about the performance prospects of projects in the portfolio requires more than assessing the "iron" triangle criteria complying to budget, time and scope. The modern view is that projects are used to run a temporary *business process* and fulfill *business goals* (Turner and Zolin, 2012; Serrador and Turner, 2015): Decision-makers want to know, which value projects create, what risks they involve, and what they contribute to reaching strategic goals. The instruments to prepare such information are *business plans for projects.* Kopmann et al. (2015) investigate the influence of business case control on project portfolio success. They measure *business case control* as a second-order construct, which comprises the requirement of business cases for assessing of all projects, monitoring and adapting these business cases over the project life cycle, and tracking the success of projects in the portfolio for a considerable time after their completion. Business case control shows a significant positive effect on project portfolio success. This influence increases if project managers, line managers, and project portfolio managers are incentivized for project portfolio success. The accountability of project users and line managers on the user's side, which are typically the project owners, also increases the influence of business case control. Accountability comprises responsibilities even after project completion, i.e. clearly defined duties of the users and clearly defined targets of the project owners reaching the exploitation of the project results. The positive influence of business case control also increases with portfolio size and complexity, as well as environmental turbulence. Thus, business case control is most helpful, when it really matters, i.e. in case of complex and dynamic project portfolios. The findings also document that business case control should be complemented by clear roles for exploitation of project results, and by incentives for project and line managers depending on project portfolio success.

Risk management is also a major theme in planning and controlling projects and project portfolios. The study from Teller and Kock (2013) identifies two components of risk management at the portfolio level: (1) Creating transparency about risks and (2) Establishing capacity to cope with risks. Transparency is fostered by risk identification activities, by a formalized risk management process, and by a culture which fosters a frank and open communication about risks. Risk coping capacity is increased by risk prevention, risk monitoring, and integration of risk management in project portfolio management. Transparency about risks and capacity to cope with risk show a significant positive influence on project portfolio success. Teller et al. (2014) show that the integration of the information about risks expected in single projects into a project portfolio risk assessment is crucial for project portfolio success, and that the positive influence of this integration increases with increasing environmental turbulence.

(c) *ICT systems to support decision-making*

Information and communication systems are nowadays ubiquitous in project work and project management. The focus here is on ICT systems to support the management of single projects and project portfolios, in particular for systems to support planning, controlling and coordinating functions, and decision-making. Computer aided support for making decisions in projects has a long tradition. Tools like CPM or PERT, developed in the 1950ies helped to plan and schedule complex projects more efficiently and contributed much to the diffusion of project management tools and practices. The survey from Smith and Mills (1982) documents that most of their 40 surveyed software programs allowed to plan more than 30,000 activities. Operations research methods were also developed early on to improve resource allocation in multi-project management contexts. E.g. Terry and Ezey (1982) document that multi-project management was applied in the shipbuilding industry. The new research discipline information systems developed also contributed much

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to offer better software. DeLone and McLean (1992, 2003, 2016) discuss success measures of IT systems and their causal relationships. Petter and McLean (2009) provide a meta-analytic assessment of the DeLone and McLean Model. These sources should be considered in assessing Project Management Information Systems (PMIS), and Project Portfolio Management Systems (PPMIS). Whereas PMIS are used for the vast majority of projects, PPMIS are used less often. Meyer (2005) showed that only 20% of the organizations surveyed had special software for program / project portfolio management, but around 99% for single projects schedule and time management. Even more recent studies show that firms still focus on single project management IT solutions (Besner and Hobbs, 2012). Kock et al. (2015b) find a positive impact of PPMIS using intensity on project portfolio success, mediating by project portfolio management quality. This effect is positively moderated by the maturity of single project, portfolio, and risk management processes. These findings imply that organizations must reach a sufficient maturity of their PM processes, before a PMIS or PPMIS can create (additional) value. One may conclude that organizations striving for project-orientation should first do their homework and formalize their processes in order to get better information into their systems, and to avoid garbage-in-garbage-out decision support systems. However, on the other hand the implementation of PMIS and PPMIS are useful in defining the PM processes better and to lay more stress on information quality and utility and usability of decision support systems. In addition, there should be a fit between the processes, the decision-making culture and the decision support systems.

Overall, the three structural components (1) organizing of specific integrative permanent structures, of project portfolio processes and of roles, (2) implementation of an integrated project planning for single projects and project portfolios and its alignment with strategic planning, and (3) ICT systems to support and automate these tasks, have been shown to increase the maturity level of project management, and the performance of single projects and project portfolios. They help to create a higher level of operational and strategic clarity and help to improve the alignment of project portfolios to strategic goals. If the strategy is to create more value through more innovative products, services, processes, and infrastructures, then the structural components can foster such a goal. If an organization classifies their projects according to their innovativeness, and if it reserves specific budgets within which highly innovative projects only compete with other highly innovative projects for scarce resources, then such a resource shield may protect exploratory projects, which can generate real options for future follow-up projects. Thus, the structural components will not by themselves lead to a higher innovation success, but they can be used to give more resources and autonomy to innovative projects, and to align project portfolios better with strategic innovation goals. This requires that power promotors, process promotors, and expert promotors recognize these opportunities and pursue them in favor of innovation (Gemünden et al., 2007; Mansfeld et al., 2010; Rese et al., 2013; Rost et al., 2007). Turner and Keegan (2001) would argue that stewards and brokers should act accordingly.

The contributions of key people like promotors, technological gatekeepers, brokers and stewards, have often been shown to overcome barriers against innovation and develop and market innovations successfully. The implementation of the above described structures, which can be considered a *management innovation,* requires an active engagement of such people. In the organizational development process to master this change, the key persons may act as mentors, coaches, peers, networkers, and sponsors, which bring required people together, create confidence and trust in the value of this management innovation, and legitimize required investments of financial and human resources. It should be acknowledged that there are substantial barriers against new and more centralized structures, roles, processes and ICT systems, because they change the power distribution, increase transparency, and require the usage of scarce resources.

4.2. People

The project-oriented organization is an organization where *people* are prepared for work in projects, i.e. they learn how to work in project environments. They then learn even more on the job through the work on a demanding project task, and exchanges within cross-functional teams, and eventually other teams working in the same project. Finally, they transfer their knowledge gained in one project to other people or apply it in other projects. Although this story sounds nice, reality is different. The project-based organization structurally separates one project team from another. This configuration has negative consequences for organization-wide knowledge processes (Müller, 2015). Project team members are formally asked to divide their effort and time between the immediate project tasks and the knowledge sharing activities for organization-wide learning. In reality, employees mostly focus on their project-based activities and neglect cross-boundary knowledge sharing (Swan et al. 2010; Müller, 2015). Moreover, Keegan and Turner (2001) reveal time pressures, deferral, and centralization of knowledge in database, intranets etc. as strong barriers impeding learning within and between projects.

Our model of the *learning* project-oriented organizations starts with the informal knowledge exchange in project teams, which is triggered by leadership, team composition, and autonomy. We then add the contributions of HR management, ideally acting in an alliance with project management and top management, in order to systematically develop competences and career systems. Finally, we look at specific structures and processes of knowledge management. Thus, we see three components through which the project-oriented organization creates a supportive context for efficient and effective learning: (a) leadership and teamwork, (b) competence development and career systems, and (c) knowledge management.

(a) **Leadership and teamwork**

Teamwork quality positively influences learning and innovation within cross-functional project teams (Högl and Gemünden, 2001). The influence is particularly strong in case of highly innovative projects (Högl et al., 2003). The meta-analysis from

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Hülsheger et al. (2009) confirms this positive influence and adds further process characteristics like vision and external communication. Team-work quality within a team positively influences the cooperation with other teams in multi-team projects and learning from them (Högl et al., 2004). The influence of inter-team cooperation on learning is stronger than the influence of within-team cooperation (Högl et al., 2004). Thus, cooperation within and between project teams not only improves the efficiency and effectiveness of projects, but also learning. The findings further show that teamwork within and between teams in a project has the highest influence, when it occurs already *early* in the project, and when the innovativeness of the project is high, i.e. when uncertainty is high and learning is really needed (Högl et al., 2003; Högl et al., 2004).

A major determinant of teamwork quality is the *leadership* of project teams (Högl and Gemünden, 2001). Different schools of leadership (Turner, Müller 2005, 2006; Müller et al., 2012; Thyssen et al., 2013) have shown that leadership positively influences group performance. The meta-analysis from Judge and Piccolo (2004) shows that transactional contingent reward *and* transformational leadership are positively related to various performance criteria. The meta-analysis from Dulebohn et al. (2012) documents a positive relationship between leader-member exchange (LMX) and performance, behavior, attitudes, and perceptions. They also document a very high correlation of LMX with contingent reward and transformational leadership.

Keegan and Den Hartog (2004) were the first to analyze transformational leadership in a study comparing project and line managers. Their study showed that line and project managers did *not* differ significantly in their leadership behaviors. However, the impacts of transformational leadership did differ: For project managers there were no significant effects, whereas for line managers transformational leadership showed the expected positive effects, i.e. increasing motivation and commitment, and reducing stress. Keegan and Den Hartog (2004) discuss several reasons for this surprising result; among others they assumed higher influence of line managers on career success, and a stronger closeness of HR managers to line managers. Müller and Turner (2007) report positive influences of emotional (EQ), intellectual (IQ), and managerial competences (MQ) of project managers on their self-assessed leadership performance. When comparing project and functional managers, emotional and intellectual competences were even more important for functional managers, while managerial competencies were more important for project managers. Similar to the study of Keegan and Den Hartog (2004), leadership characteristics show a different influence strength for project managers than for line managers. Müller et al. (2012) analyzed the moderating influences of faith, fact, and interaction. *Complexity of faith* meant that it was uncertain whether the project result could be reached, *complexity of fact* relates to the number of people involved, the interdependencies, and the amount of information to be processed, *complexity of interaction* relates to the transparency of information and to the empathy with stakeholders. The study shows that *the impact of the competences is moderated strongly by these complexities*. Under complexities of faith all three competences EQ, IQ, and MQ show significant positive interaction effects. The other two complexities show no significant moderating influence, with one exception: under complexities of fact managerial competences show a negative influence.

Overall, the studies on leadership in projects raise the question for *moderating variables,* particularly because there is a high *heterogeneity* between projects, but also between contexts influencing them, and these contexts are changing. We face more multi-team projects, more frequent memberships in several teams at the same time, more diverse, more dispersed teams, and an increasing degree of virtual communication. This makes it difficult to generalize from existing studies. The concepts of teamwork and leadership themselves are changing.

In more dispersed and virtualized teams, the need for *shared leadership* and *self-management* increases, but this is not yet recognized in practice (Högl et al., 2011). Müthel et al. (2012) show that shared leadership increases the performance of internationally dispersed teams (see also Hoch and Kozlowski, 2014). Moreover, they find that the influence of traditional vertical leadership decreases with increasing virtuality. However, Högl and Müthel (2016) show that team leaders tend to underestimate the team members' capacity to lead themselves. As a consequence, these leaders monopolize decision-making authority and provide insufficient levels of autonomy for team members to tackle their tasks. Haberstroh (2017) shows that self-leadership of team members (Manz, 1986; Manz and Sims, 1980) also improves project performance. Further, leadership for individual self-leadership through the project leader enhances self-leadership and project performance. Such a project leader encourages individual team members to lead themselves, and consults them in doing so. The study also shows that autonomy of team members increases self-leadership.

Martinsuo and Lehtonen (2009) discuss different dimensions of *project autonomy* and barriers impeding autonomy. Gemünden et al. (2005) show a positive influence of project autonomy on information exchange and innovation success, which increases with increasing innovativeness. Högl and Parboteeah (2006) find that team-external influences reduce teamwork quality, while team-internal equality increases teamwork quality, which in turn increases learning.

(b) Competence development and career systems

Learning is also improved by activities of human resource management (HRM) in contributing to attracting, selecting, assigning, developing, recognizing, and retaining the right team members and project leaders. These activities may contribute to higher emotional, managerial, intellectual, and problem-specific skills, and a better matching of project demands and personal competences. Typically, HRM helps to assess the project requirements of different classes of projects, and different levels of competences of project managers, which form the base of project-management career system. This helps in aligning capabilities with strategy and to develop the competences according to strategic requirements (Crawford et al., 2006). *Formalized processes and clear roles* of HR manager, line manager, and project manager in these processes help to develop and retain project managers with an increasingly improving

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competence (Ekrot et al., 2016a). However, it is necessary that the *career system* addresses the specifics of the project management context, which means that project managers get equal pay compared to line managers working on tasks with an equal difficulty, that project managers get promoted with at least the same speed as line managers, that there training and coaching matches the needs of their career stage, and that they have a saying in getting assigned to projects that match their development and preferences. The analysis from Ekrot et al. (2017) documents that the *perceived organizational support of project managers* is positively influenced by such a career system combined with coherent qualification opportunities, and by formalized processes for single projects and project portfolios, caretaking project management offices (PMO), and a visible engagement of senior management for a project-oriented organization. The perceived organizational support increases work satisfaction, and it reduces the tendency to leave the project management context. The latter is important, because the more successful high-potential project managers, had a higher preference to leave the project context, and change to a line position or to a consulting job.

Learning project-oriented organizations do not only offer their project managers better careers and more motivating tasks, which fit better to their current capability level, they also exploit the knowledge of their project managers better. Ekrot et al. (2016b) analyzed the antecedents of *voice behavior* or project managers. They found that career systems and qualification opportunities also triggered more voice behavior. Voice behavior was also encouraged by idea encouragement and collaboration with peers. These organizational features of the project-oriented organization are moderated by two individual characteristics, i.e. organization-based self-esteem and affective organizational commitment. The voice behavior of project managers contributes a lot to the learning of senior managers, and Kock et al. (2016a) showed that this voice behavior significantly increased project portfolio success. *Thus, it is important for organizational learning to listen to the voice of competent and motivated project managers.*

(c) **Knowledge management**

Among the structures and processes established for knowledge management in project contexts "*lessons learned*" systems are the most widely spread (Keagan and Turner 2001; Müller, 2015; Ekrot et al., 2016a). Capturing and sharing lessons learned from projects has been discussed as appropriate practice to enable the continuous creation of organizational capabilities (Davies and Brady, 2000; Von Zedtwitz, 2002) and to realize increased average project performance in the future (Newell and Edelman, 2008). Based on two case studies, Davies and Brady (2000) proposed an *organizational learning cycle*, which models the building of organizational capabilities based on lessons learned from initial projects and which leads to improved project management procedures and higher project performance of similar follow-up projects. Ekrot et al. (2016a) define a *lessons learned systems* as the systematic practice of capturing and disseminating knowledge gained during projects. Capturing knowledge assesses whether project knowledge is systematically documented, processed, and reflected during the whole project life cycle, and not only at the end, as proposed by Keegan and Turner (2001). Lessons learned measures whether this knowledge is also systematically distributed and transferred to future projects or organizational routines (Newell and Edelman, 2008; Prencipe and Tell, 2001). Ekrot et al. (2016a) show that lessons learned systems increase competence levels of project managers and project portfolio performance.

Reich et al. (2014) present an interesting study which analyzes the impact of knowledge management (comprising enabling environment, knowledge practices, and knowledge stock) on project-based knowledge, and knowledge alignment. Knowledge alignment captures the achieved degree of coherence and shared understanding across the specialists in the IT team, the organizational team responsible for business change, and the business sponsors with knowledge of what the project must achieve for the business. The study shows that knowledge management positively influences knowledge alignment and project-based knowledge, which also positively influences project alignment. Project alignment acts a mediator to the business value created by the project, thus knowledge management and project-based knowledge exert an indirect positive influence on the business value created by a project.

Lindner and Wald (2011) provide a good review on knowledge management in projects and develop a model to explain perceived knowledge management effectiveness. They test a variety of variables belonging to three categories (1) Organization and processes, (2) ICT systems, and (3) Culture and Leadership. Most of these variables show a significant positive influence on perceived knowledge management effectiveness.

Müller et al. (2013) investigate the knowledge flows among and between project managers and project management office (PMO) members in a pharmaceutical R&D company in China. Their results show that knowledge exchange happens in clusters, where each cluster forms around a PMO member. However, contrary to expectations, PMO members were not identified as the most popular knowledge providers in these clusters; instead, knowledge was requested from earlier collaborators. This study illustrates the implementation of communities-of-practices to support knowledge exchange of tacit practice-related knowledge. Using data from the communities-of-practice of a project-oriented IT division of a large German firm Zboralski et al. (2006) can show that information exchange improves the network position in such a community, and individuals possessing such a position create significantly more knowledge, more business value, and receive more recognition from their peers and supervisors.

Overall, the three people-oriented components (1) leadership and teamwork, (2) competence management and career systems, and (3) knowledge management for project personnel, have been shown to increase the maturity level of project management, and the performance of single projects and project portfolios. They do this by increasing individual competences and individual motivation, by improving cooperation within and between projects, and between project and line personnel, and by offering key people job opportunities to develop themselves in the right moments with projects that fit to their competence and potential in this stage of their careers. This will not only lead to a better

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performance of projects, and to higher benefits for project customers. It will also result to a higher competence retention (Ekrot et al., 2016a, 2016b), which fosters innovation success, particularly if these competences are relevant for mastering innovations. Several meta-analyses have documented the positive influence of leadership, teamwork and knowledge management on innovation success. Thus, the measures taken to improve leadership, teamwork and knowledge exchange and usage will increase innovation success, particularly in case of highly innovative projects. The implementation of the above described people-oriented measures requires an active engagement of key people. Thus, the same arguments as for the structures described in Section 4.1 apply. In a very recent study Aargard (2017) identified several HRM-practices, which help to improve the front end of radically innovative projects in the pharmaceutical and biotechnological industries. Her study documents the importance of coherent bundles of HRM practices for the success of science-driven innovating companies.

4.3. Values

Our model of an innovating project-oriented organization contains three core values, which foster project management and innovation (a) future orientation, (b) entrepreneurial orientation, and (c) stakeholder orientation.

(a) **Future orientation**

Future orientation means that *future success is prioritized above current success.* Such a prioritization aims at long-terms goals and *sustainable development.* "Sustainable development is a development that satisfies the needs of the present without risking that future generations will not be able to satisfy their own needs." (Brundtland Report 1987, Chapter 2.) Projects are investments that consume resources in the present in order to create results that enable a better future. A decision to perform projects usually implies a waiver of current consumption and/or the usage of resources which have been saved. The question is not *if* the needs of future generations should be prioritized, but to which *extent* the needs of the present should be considered. An innovative organization wants to create more value with future products and services than other organizations, it wants to improve the efficiency of its processes through superior solutions more quickly than other organizations. Thus, an innovating organization should profit from a prioritization of the future.

Future orientation also implies a *willingness to cannibalize* existing products, investments, and capabilities. In the large-scale study from Tellis et al. (2009) of more than 750 firms in 17 countries, willingness to cannibalize emerged as one of the strongest corporate culture predictors of successful radical innovation and proved to be considerably more relevant than firm size.

In order to implement a higher future orientation, people who contribute to the management of projects in various roles should be *empowered* in comparison to people who are not contributing to projects. But they should also be made more *accountable* and *responsible* for the project processes and their results. The empowerment of project managers is a critical issue since the invention of project management. At highest governance level, rules should be established how much power and responsibility should be given to project managers, project steering members, project portfolio coordinators, project portfolio boards, project office managers and other project-contributing stakeholders, depending on the type of project or project portfolio they are managing. Very often project managers get more accountability and responsibility than decision-making power. The idea that project managers should manage a project within limited time, limited budget, and according to defined functional requirements (scope) – instead of creating value for the stakeholders of a project – puts constraints on the autonomy of project managers, and limits their power. The influence of project managers is further reduced if project managers have only a limited authority to give orders to their project team members, or if team members only work a small part of their time for the project. Then project leaders become care-takers and "*coordinators"* instead of managers (Turner and Müller, 2004). Several studies show that an empowerment of project managers leads to better performing projects (Larson and Gobeli, 1989; Clark and Wheelwright, 1992; Patanakul et al., 2012), particularly for highly innovative projects. Project managers are still too often considered as *deputy* managers, who support line managers. However, a line manager in operations and a project manager in new product development *both* manage *business* processes. A major difference is that the sales and cost influenced by the innovation project are the figures of *future* periods, whereas the operations manager influences the figures of the *current* period. An innovation-oriented leadership has to take care that the results of future periods at least get equal recognition, because speed matters in competing for innovations.

A higher recognition of projects is also achieved if projects are used as formats to develop and implement strategies. This means that strategic decisions are organized as projects. This principle is applied in *strategic initiatives* to develop or transform organizations: they are often organized as programs with defined milestones (Whittington et al., 2006). We also observe that growth strategies are initiated via *exploratory projects* to find new business opportunities, to assess their feasibility, value and fit and to build real options, that might be seized in follow-up projects. Strategic planning still relies on foresight and analytical activities, but is done in a much more decentralized and interdisciplinary way. (Whittington et al., 2016). Projects should also be used as formats to prepare and organize strategy workshops. During strategy workshops hands-on, practical crafting skills in getting strategizing done matter most.

Finally, Shenhar (2001) introduced preparedness for the future as a success criterion for the management of individual projects. Building on their work, Meskendahl (2010) expanded this construct by arguing that future preparedness functions as an important outcome not only for single projects, but also at the project portfolio level. Thus, future orientation can also be implemented by laying stress on preparedness for the future in strategic projects, and in projects portfolios. Rank et al. (2015)

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analyze antecedents of reaching preparedness of the future at the level of project portfolios.

(b) Entrepreneurial Orientation

The entrepreneurial orientation concept is rooted in the strategy-making literature and can be described as "the entrepreneurial strategy-making processes that key decision makers use to enact their firm's organizational purpose, sustain its vision, and create competitive advantage(s)" (Rauch et al., 2009, p. 763). Miller (1981) characterized entrepreneurial firms as those that pursue innovation, aggressively enter new markets, and accept a measure of strategic risk. Based on this work, Covin and Slevin (1991) suggested that a firm's strategic behavioral proclivities range on a continuum from more conservative to more entrepreneurial. They posited that the entrepreneurial end of the continuum is evidenced by innovativeness, pro-activeness, and risk taking. *Innovativeness* is the willingness to introduce newness and novelty through experimentation and creative processes aimed at developing new products and services, as well as new processes. *Pro-activeness* is a forward-looking perspective characteristic of a marketplace leader that has the foresight to seize opportunities in anticipation of future demand. *Risk taking* means making decisions and taking action without certain knowledge of probable outcomes. Rauch et al. (2009) find in their meta-analysis that all three dimensions positively relate to firm performance. Kock and Gemünden (2016b) find that four success factors of project portfolio management, i.e. stakeholder involvement, strategic clarity, business case monitoring, and agility, become even more important for high levels of entrepreneurial orientation. This means that the higher project portfolio success which innovators realize can be explained by differences in their decision-making. Innovators do not involve stakeholders more often or less often than non-innovators, nor do they create a higher or lower clarity about deliberate strategies, or use business cases more or less often. But they show a higher agility in responding to higher levels of strategic and operational clarity. In addition, innovators show a more pro-active behavior, leading to a better preparedness for the future (Rank et al., 2015). They engage much more management involvement and budgets in creating ideation portfolios, they integrate these closely with their project portfolios, and they are willing and able to invest additional money in order to exploit the created growth options (Kock et al., 2015a, 2016b).

(c) Stakeholder orientation

A core idea of projects is to bundle competences from different functions and disciplines in order to frame and solve problems better and more quickly. Thus, the idea of knowledge combination and cooperation is central to project management. This should be reflected in the corporate culture. A cooperation between functions, between hierarchical levels, and with external partners should be a central value. This idea is also central to stakeholder management (Eskerod et al., 2015). It has been shown that such cultures positively influence project portfolio success (Unger et al., 2014). An explicit project management culture, which Gareis and Huemann (2000) stress may probably include further values such as future-orientation and sustainability (Huemann 2015, pp. 68–70, Rank et al., 2015). It is important that the organization perceives itself as project-oriented and has a clear shared understanding about the core values of a project-oriented organization (Gareis and Huemann, 2000).

The reported values, which should reflect a corporate mindset and be anchored in the attitudes and behaviors of upper, middle, and lower line and project managers, have been documented to influence innovation and project success positively. However, they do not directly influence success measures. They are driving the strategic goals towards a prioritization of more innovative projects, they motivate managers towards pro-active behavior, e.g. to develop a pipeline of ideas, concepts and pre-development projects, which enable decision-makers to choose between projects that have a higher value potential and a reduced uncertainty when it comes to decisions about projects that are closer to exploitation goals. The empowerment of project-related roles gives the protagonists more autonomy, resources, and influence so that they can experiment more and try out completely new solution alternatives, and/or address completely new customers and needs. We expect that the values either work as motivating and guiding antecedents, or as competence enhancement by widening the scope.

5. Summary and outlook

We started the development of our model with an observation from Wald et al. (2015a): The share of work-time of a firm spent in projects correlates positively with the innovation success of a firm, and the innovation success correlates positively with the business success of a firm. *However,* the share of work-time does *not* correlate significantly with the business success. This raises the following questions: *What is different with innovation leaders? Does working in non-innovative projects not create extra value? Why and how do innovative projects increase business success? How can we systematically explain why and how innovators create more value?*

We can now show some ways how to address these questions by analyzing three different effects:

(1) Do innovation leaders develop and use *other* practices of PM?
(2) Is the *impact* of the same PM practices higher for innovation leaders?
(3) Do innovation leaders also enforce *other*, non-PM-related, value creating practices?

In the following, we give some examples for each of these three explanatory paths.

(1) Innovation leaders lay much more stress on the *front end* of their innovation pipeline. They have developed a variety of methods to generate better and more ideas, and processes how to select the best one and to develop them further to become concepts and advanced projects. When

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the results of this ideation stage enter the traditional project portfolio then the innovation leaders can choose among higher valued projects with more mature and better tested business plans. Innovation leaders are also more *people-oriented*—on average they reach a higher level of maturity and professionalization in leadership, teamwork, bespoken HRM-Systems which fit the needs of project management, and knowledge management systems. Finally, innovation leaders are *more open to voice behavior* of their project managers, they recognize the opportunities for change, and take them as impulses for potential *emerging* strategic options.

(2) The *impact* of the measures to create strategic and operative clarity is higher for innovation leaders, because they respond more quickly and more consequently to the information they get. They are more responsive to react upon unexpected risks and opportunities, and they do this more consequently. Nowadays such a behavior is considered as being more agile. Further, if innovation leaders prioritize higher innovative projects, *their project managers and team members are more motivated and experienced in executing such projects and in coping with more ambiguity.* They embrace uncertainty as an opportunity and experience unknown solution paths as a positive challenge. Their team members have a preference for a greater fluidity and variability of knowledge, skills, and the division of labor—like Whitley (2006) has described it for the type of Organizational PBFs.

(3) Innovation leaders enforce *other* value creating practices, which are not related to project management. For example, in marketing they enforce measures which position their products and services as superior premium brands, in HR they position themselves as a premium employer, which offers a good competence development, high income, good work climate and a high employment safety.

Overall, our proposed model provides the following contributions. First, the model *integrates* the contributions of very different management disciplines, which have been applied in the realm of projects: (a) organizational theories to define structures, processes, roles, and governance principles; (b) strategic theories analyzing the use of projects as formats for strategy processes; (c) planning and controlling theories applied to projects and projects portfolios; (d) ICT theories to design information systems supporting communication, collaboration and decision-making; (e) leadership, teamwork and knowledge management theories to improve cooperation and learning, (f) HRM theories to design career systems matching project requirements, and to attract, select, develop, motivate and retain highly competent project management personnel, which master challenging projects with an intrinsic motivation.

Second, the model integrates all levels of project management: single projects, project portfolios, and the project-oriented organization. The model selects characteristics of project management at all levels, which support a future-shaping innovating organization.

Third, the model is based on empirical evidence gathered in these different disciplines, and differences between the usual application fields and the project environment get specific recognition, e.g. the differences of leadership in line and project contexts.

The value of the model lies in the interaction of the components. For example, decision-making in project portfolio contexts is complex and dynamic. Kock and Gemünden (2016a) show that a *bundle* of five very different antecedents i.e. strategic clarity, process formality, controlling intensity, innovation climate, and risk climate, is needed to create strategic and operational clarity, which then positively influences decision-making quality and the agility and consequence in implementing these decisions. Given our model, further components can be added to such a study.

Overall, innovating project-oriented organizations exploit the information delivered by their projects and projects portfolios faster and more intensively. They also proactively manage a pipeline of ideas, concepts, and exploratory pre-development projects, which gives their downstream project portfolios more valuable options, from which the decision-makers can choose. For innovation leaders, the human resources in project portfolios are not "given"—rather they are perceived as highly valued intellectual and social capital, which do not only represent core competences, but also give the organization *dynamic* capabilities, that allow them to adapt to changing environments and exploit new opportunities. Such project-oriented organizations are not only excellent in performing todays tasks, they are also better prepared for future challenges: they shape the future. Thus, our model offers a coherent view, which elements of project-orientation innovating organizations can exploit in addition to their other instruments, which foster creativity and commercialization of innovations.

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