

Performance Management of Corporate Venturing Activities in Manufacturing Companies: An Exploratory Study

Günther Schuh¹, Leonie Budweiser², Frederic Lademann²

¹Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University, Aachen, Germany

²Fraunhofer Institute for Production Technology (IPT), Aachen, Germany

Abstract

Recent trends in manufacturing industries such as digitalization and sustainability have underlined the need for companies to significantly change their products and processes. This emphasizes the need for the capability to make use of radical innovations (radical innovation). However, many incumbent companies struggle to reliably create radical innovation since their research and development (R&D) is usually optimized to exploit competencies via incremental innovations. Thus, their innovation processes and setups fit the predictable and structurable needs of incremental innovation. In contrast, radical innovation are less predictable and, thus, require more agile and reactive processes. To benefit from startup-like structures, manufacturing companies started to increasingly use corporate venturing (CV) activities in the early 2010s. However, the performance of established forms of CV differs drastically. Also, there are still no definite findings on how to set up and use a performance management system to reliably increase CV performance. Therefore, this paper aims to explore the insights of practitioners on which problems and challenges occur in the innovation process of CV units and how they could be solved using performance management systems. To achieve this, the research includes an interview study with 17 different companies of the manufacturing sector in German-speaking countries which run a CV unit.

Keywords

Corporate Venturing; Innovation Management; Technology Management, Performance Management; Radical Innovation; Separate Innovation Units

1. Introduction

Innovation is an important topic for corporates to ensure their long-term competitiveness [1, 2]. There are several objectives for corporates that contribute to this overarching goal which can be divided into financial and strategic objectives [3]. Financial objectives are, e.g., finding new ways for generating revenue, such as new products or business models [4]. Strategic objectives can lie, e.g., in the enhancement of use of corporate assets, the strengthening of the corporates position in the market through diversification [5] or the finding of new business areas for the corporate [3]. This poses enormous challenges, especially for manufacturing companies. These have typically optimized specific technological competencies in their core business over many years and are now challenged to adapt the business to the speed and impact of the digital and sustainability transformation in their environment [6]. Incremental innovations in contrast to radical innovations usually cover minor improvements or optimizations to corporates and their products which require a low level of changes [7]. Radical innovations on the other hand, excessively change the use of corporates' abilities or even disrupt them completely [7]. This differentiation is in line with the theory of ambidexterity, which states that corporates need to achieve exploration and exploitation in order to be

This Paper has been reviewed by the Certified Reviewer Community of publish-Ing. – 1 review – double blind

successful as a corporate [8]. Exploration – the discovery of new business can be associated with radical innovation, while exploitation of existing resources and competencies can be associated with incremental innovation [8, 9]. One widely acknowledged phenomenon in this context is the “innovator’s dilemma” [10] that describes the difficulty for incumbent companies to produce radical innovations, whose management practices usually promote incremental innovation and thus contradict radical innovation’s requirements for development. Therefore, the need for radical innovations is one major reason for today’s relevance of CV which allows for a separation of radical innovation activities from the core processes. This is needed because radical innovations have some characteristics that do not match the known structures for innovation that have been in use for a long time [11]. Some of those characteristics are, for example, the unpredictability of radical innovation processes and their outcome, their long-range planning horizons, and their inconsistent success rates [11, 12]. Those characteristics require innovation processes to be able to react on changing environments and the freedom to redirect or spontaneously discontinue innovation efforts. This requirement is not compatible with the highly structured, linear and inflexible innovation management that is useful for incremental innovation [13]. In recent years, the concept of corporate venturing and separate organizational units for its purpose have become established in theory and practice. However, the literature usually only refers to the different types and purposes of such units as well as their design, but not to the operational business [14]. Therefore, this paper aims to empirically lay the foundation for the design of an effective and efficient management system for radical innovation in separate innovation units.

2. Theoretical Background

The theoretical basis for this study is presented below. First, corporate venturing units (CVU) will be discussed, followed by performance management and a selected theoretical model, and finally the potential of performance management for corporate venturing.

2.1 Corporate Venturing Units

For incremental innovations, a sequential approach with clear stages and gates has been common for a long time [15]. For radical innovations, on the other hand, which are generated in contexts of high uncertainty and change, it is now widely recognized that agile methodologies are better suited. As this requires completely different structures than innovation in the core business of companies, separating innovation processes for radical innovation from the rest of corporate processes has become a widely used mean to enhance agility and flexibility of innovation activities [16]. Practitioners came up with several concepts e.g. ones that follow the core principle of separating innovation from corporate processes [17]. Most of those concepts can be summarized under the term corporate venturing: It refers to the totality of entrepreneurial activities carried out by incumbent corporates [18]. The outcome of corporate venturing, however, does not always have to be the establishment of new ventures. Instead, the term also includes set-ups that primarily aim for a later integration of the innovations into the core business of the corporates [19]. The set-up of these units varies depending on the strategies that the corporates want to pursue. While separate units for innovation have proven to have a positive effect on exploring radical innovation [20], they do not consistently perform well and some of the established units have already been closed shortly after establishment [21]. Performance management is already considered a successful means of influencing behavior to improve performance in other contexts with changing environments, so exploring it for corporate venturing seems promising. Therefore, there is still a need to investigate the effective operation of these units. Performance management is already considered a successful means of influencing behavior to improve performance in other contexts with changing environments, so exploring it for corporate venturing seems promising [22].

2.1 St. Galler Performance Management Model (SPMM)

Generally, for the management of business operations, there are various approaches and means to steer respective processes. The use of management control systems is a frequently used approach for managing all kinds of business operations [23]. Their general concept is to use a mixture of cultural, cybernetic, administrative, and planning control mechanisms to steer the corporate processes towards overarching strategic goals [24]. The present paper focuses on Performance Management which focuses more on long-term improvements of corporates' performance than on short-term optimization of key figures [25]. A widely acknowledged groundwork that explains the basis of how to structure performance management has been provided by Ferreira and Otley [26]. Their framework consists of twelve questions that corporates need for the implementation of a Performance Management System. A model that is based on that and serves as application-oriented approach for detailing the PMS for radical innovation is the St. Galler Performance Management Model (SPMM) by Möller et al. [22]. It consolidates Ferreira and Otley's framework in a clear system with five different perspectives on corporate processes. The perspectives that form the SPMM are: (1) *Define and Engage*, (2a) *Target and Plan*, (2b) *Execute and Adjust*, (2c) *Review and Assess*, and (3) *Align System and Context* (see Figure 1). Firstly, management needs to define and motivate the purpose or normative and strategic orientation of the activities (1). This is operationalized in the operative cycle (2a – 2c). This includes setting specific targets and planning respective tasks for these (2a), task execution with the desired flexibility and freedom for decision making on-the-job (2b) as well as the review and assessment of outcomes of these specific tasks (2c). Lastly, the process, structures and company internal and external contexts are critically reflected with respect to their suitability for goal achievement (3), which represents another strategic aspect of performance management. Furthermore, it aims for continuous improvement of self-steering [22]. For the present study this model is well suited as a structure to allocate specific challenges and success factors to specific tasks of the Performance Management System as both strategic and operational aspects are covered in a concise form.

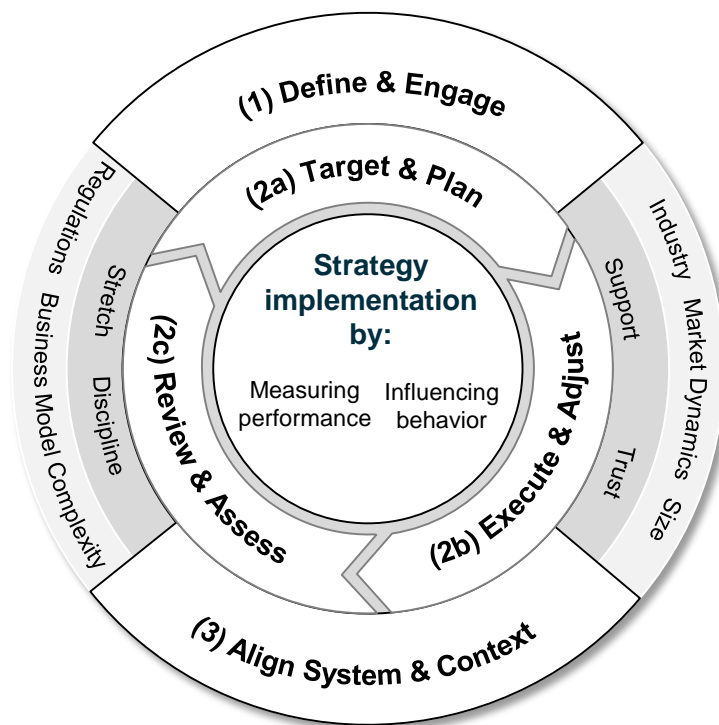


Figure 1: St. Galler Performance Management Model, own illustration based on [22]

2.2 Performance Management for CV

As mentioned above, researchers suggest that Performance Management need to be adjusted for the specific context in which they are implemented [27]. However, neither the framework of Ferreira and Otley, nor the SPM were specified to the requirements of innovation, let alone radical innovation [22, 26]. This implies that the model requires some adjustments that account for the unique characteristics of the mentioned environment. The following section discusses the requirements that arise from the existent literature about managing radical innovation, since this topic has already been extensively examined from different perspectives. The lack of combinability of radical innovation and regular R&D activities has been topic of various studies [12]. As one key difference between incremental innovation and radical innovation processes is that the latter must deal with more uncertain environments and project outcomes. This implies that radical innovation management needs to allow for more flexibility in the processes [15, 28]. Thus, other than incremental innovation projects, radical innovation projects cannot follow a traditional linear path for strategy realization [29]. For radical innovation, firms are often not able to predict all relevant goals for achieving their strategy [29, 30]. Hence, literature suggests breaking the linearity and using multiple feedback loops to allow for adjustments as part of the PMS when circumstances change [29]. Modern versions of PMS that are applied in more risky and uncertain environments use a more interactive approach that allows for bottom-up strategy formulation, creativity-fostering, flexible processes, and knowledge-oriented process orientation to account for knowledge creation and spreading across the corporate [23]. While there are already some propositions for potential adjustments for radical innovation processes, there is still no comprehensive framework on the challenges and success factors for the set-up of a PMS for radical innovation. Furthermore, PMS is known to be context dependent. Hence, optimization of PMS needs a dedicated view on the environment in which it is implemented. However, the setup and operation of a PMS has not been analysed in the context of CV activities. This realization leads us to the following research questions:

1. What are challenges that hinder companies from successfully managing the performance of radical innovations in CV units?
2. What approaches are there to overcoming these barriers in the successful management of radical innovations in CV units?

3. Methodology

To empirically answer the before mentioned research questions, the authors needed to decide for a method for data collection and a data analysis [31]. Due to the exploratory nature of the study, the utilization of semi-structured interviews as qualitative approach is well suited. Those are specifically useful for identifying insights on a topic with no predetermined opinion or definite fact basis [32]. Also, qualitative data is useful for putting insights into specific contexts [33]. With respect to the data analysis, authors decided for qualitative content analysis to structure and summarize the findings.

3.1 Procedure and Sampling

Semi-structured interviews use open questions to get detailed information about the topic. However, they do not require interviewers to strictly follow interview guidelines, but leave some freedom for switching order, formulations, and redirection of questions [34]. This way, they allow the interviewer to react on the flow of the conversation and, thus, obtain information on topics that were not prepared beforehand [34]. Furthermore, the method provides the opportunity to connect with interviewees on a personal level that makes them feel more comfortable with sharing insights on a more confidential level [34]. To gain valuable insights, the interviewees needed to be experts on the research topic [36]. Therefore, the authors defined the target group of the interviews to be employees in managing positions on project or department level in CV units. As mentioned earlier, there are many different approaches to executing CV. As there is no uniform

terminology for CV units in literature and practice, the authors defined the coherence of units to the before mentioned definition of CV activities based on the following characteristics: The innovation unit needs some kind of direct interface with the parent company. The unit must execute radical innovation. Also, the innovation unit must be structurally separated from internal R&D departments. And lastly, the task of the unit needs to include creating new businesses for the corporate or transforming its core by radically changing its core capabilities. For this paper, units that fulfil these requirements are referred to as CV units. To consider the special challenges of manufacturing companies, only those CV units belonging to companies in the manufacturing sector were considered.

3.2 Sample and Data Collection

Research in the German-speaking CVU landscape that fit these criteria led to 61 units. From each SIU, at least one expert was contacted. 17 experts were available for an interview in the requested interview period. The characteristics of the sample are described below, with the numbers in parentheses representing the number of participants to whom the description applies. The position of the interviewees was project managers (5), department managers (9), and members of management boards (2). The self-given labels of the units were digital/innovation lab (7), innovation division (4), incubator (3), and venture/company builder (2). Most of those units were headquartered in Germany (13), but also SIUs placed in other European (2) and American (1) countries were included. This shows that the sample of the study has a bias towards German firms. However, most of the corporates have secondary offices on international grounds to participate in international markets (14). So, they consider international needs regarding the outcome of the innovation as well. The interview participants cover a broad span of different industries. Their core businesses of their parent companies cover sanitary technology (3), automation technology (2), automotive technology (1), medical technology (1), construction technology (1), agriculture (1), packaging (1), raw material production (1), and general high-tech development (5). Most of the units exploit their innovations by integration into the core business of the corporate (10). However, almost 40 percent of the units primarily exploit the innovations within the SIU or found spin-off separate ventures (7). Furthermore, the majority of SIUs were legally part of the corporate (10), but some of them were also established with an own legal form, mostly as a limited liability company (6).

The interviews were scheduled for 60 to 90 minutes to allow enough room for personal introduction, exchange and to elaborate in-depth on the issues raised by the interviewees. As usual for semi-structured interviews, the preparation of the interview guide included collecting potentially interesting open-ended questions and bringing them in a preliminary order [34]. This resulted in a questionnaire of 46 questions which are based on the 5 phases of SPMM. The three main topics presented in the interview guide are: (1) structure and task of the SIU, (2) management and challenges, and (3) measurement and enhancement of innovation performance. This interview guide is, however, not to be followed strictly. Instead, the form of semi-structured interviews allows for changing the order of questions during the interview or leaving them out completely if this supports the flow of the conversation and leads to deeper insights [34]. The interviews with the participants were primarily carried out via the online video software Microsoft Teams (16). One interview was conducted via telephone due to a request from the interviewee and one interview was conducted face-to-face due to the special proximity of the workplaces. When given consent, the interviews were audio recorded (15). Recording the interviews contributes to the ability of interviewees to concentrate on the conversation instead of taking notes simultaneously [34]. When interviewees did not give their consent for recording, the interview was conducted while taking notes (2). The interviews were conducted between June 2022 and September 2022.

3.3 Data Analysis

For data analysis, the raw data from the interviews needed to be made comparable. This requires bringing the open-ended questions and their answers into a form that allows drawing commonalities and differences even though the questions could have been formulated slightly differently and were picked up differently in the answers [34]. To achieve comparability, the note sheets and audio transcriptions were used as input for a qualitative content analysis. There are two ways to analyse qualitative data: hermeneutic and enumerative methods [37]. Enumerative methods are a tool for analysing the relevance of specific aspects by counting the frequency of their occurrence [37]. Hermeneutic methods, on the other hand, support researchers in identifying latent meanings in statements made by interviewees [37]. This is useful for researchers to identify challenges, success factors and connections between those two which study participants are not fully aware of. For the present study, the hermeneutic approach is chosen, as it helps creating insights of great depth from a broad bandwidth of information taken from the interviews [37]. Qualitative content analysis starts with listening to the recordings and reading notes repeatedly until the researchers reach a distinctive understanding on what has been said in the interviews [38]. Afterwards, the information was organized to provide an overview over the topics discussed in the numerous interviews. This was done by creating a coding scheme that includes open codings of statements, ordering and categorizing them [38]. MAXQDA software was used for this purpose.

4. Results

Data analysis led to codes that were structured into challenges, and potential success factors for solving those. Those are assigned to the five elements of the SPMM that were presented before. The data analysis resulted in 8 main challenges in total, which means every phase of the SPMM included one or two main challenges. Those main challenges were subdivided into two to five challenges, which add up to 31 challenges with their respective potential success factors in total. Also, we identified potential success factors for each of these challenges.

All challenges and potential success factors, which are discussed and structured below according to the five phases of the SPMM, are summarized in the accompanying Tables 1 through 9.

4.1 Define and Engage

The main challenges in the strategic phase “Define and Engage” are a too fuzzy or unrealistic mission (A) which in turn often results in disappointment with respect to the CVU’s effectiveness and an insufficient commitment and concretization of the mandate (B) which limits the CVU’s performance. A summary of all challenges and potential success factors can be found in Table 1.

Challenges that fall into the first main challenge are a lack of transparency on the need for CV activities for the corporate (A.1) which often leads to deprioritizing investments in radical innovation if circumstances change (e.g., change of management). A lack of transparency on the motivation for CV activities may lead to the second challenge: an undefined mission (A.2). This makes it difficult for the unit to prove its relevance, performance or added value, which in turn leads to high resistance from the core business. Lastly, if the mission is defined, but very broadly formulated (A.3) the CV units tend to lack focus and effectiveness, and this often results in an overloaded idea management. This in turn negatively impacts scaling and success of promising innovation projects and low performance.

To overcome these challenges, the following potential success factors are identified. Firstly, for the formulation of the mission, there must be clarity about the corporate's vision, strategic priorities, and potential threat scenarios if CV activities are not pursued (A.S1). Secondly, the mission needs a clear delineation and complementary fit with the strategy of the corporate (A.S2). At best, members of the CVU

are actively involved in the parent company's strategy work. Lastly, tactics for achieving the mission, including clear prioritization in case of multiple tasks (e.g., business creation and cultural transformation) are required (A.S3). In particular, the definition of concrete fields of innovation or action is helpful.

Table 1: Challenges and Success Factors for the SPMM Phase "Define and Engage"

Main Challenge: A. Unclear mandate impedes effectiveness			
Challenges		Potential Success Factors	
A.1	Lack of clarity on the need for discontinuous innovation / the need for a CVU	A.S1	Clear presentation of motivation as well as visions and strategic priorities
A.2	Undefined mission and consequently lack of evidence of CVU's relevance/value add	A.S2	Mission with clear delimitation from the core strategy for complementary fit
A.3	Mission formulated too broadly and thus lack of focus and effectiveness	A.S3	Strategy for achieving a target state and clear prioritization of mandates
Main Challenge: B. Insufficient commitment and concretization of the mandate reduces performance			
Challenges		Potential Success Factors	
B.1	Bad strategic handling of discontinuous innovations in the formulation of mandate	B.S1	Aiming for long-term success instead of short-term returns
B.2	Limited financial and human resources restrict the scope for action	B.S2	High initial top management commitment and needs-based access to financing
B.3	Lack of definition of exit strategies for innovations from CVU	B.S3	Providing clear exit paths for innovations and creating the appropriate conditions

In respect to the second main challenge the insufficient know-how on the strategic handling of radical innovations when formulating the mission (B.1) can lead to unrealistic expectations (in terms of amortization and impact) on the one hand, and at the same time to inadequate enablement or provision of the necessary resources (personnel, financial, etc.). Additionally, a lack of agility is also often reflected in overly strict budgeting processes for the financing of projects (B.2), although it is hardly possible to predict the required investments for CV projects in advance. Finally, the lack of early definition of exit strategies, which not only specify the target unit but also the manner of the exit process, also poses a challenge (B.3). This can result in unnecessary failures of projects in the scaling phase despite promising developments in previous project phases.

Regarding potential success factors, the performance expectation must be commensurate with the mission (B.S1). This often necessitates a rather strong focus on long-term success instead of short-term return on investment and requires appropriate resourcing. With respect to financing, needs-based access to investment sums through flexible financing rounds seems to be highly promising (B.S2). To ensure successful scaling of projects, clear exit paths for innovations should be provided (B.S3). These should also include the transfer into appropriate framework conditions for this (e.g., legal form, incentivization).

4.2 Target and Plan

According to the present study, this aspect of performance management, which serves the operationalization is subject to one main challenge in particular: lack of operationalization of the mandate (C). Four challenges and respective solution approaches can be assigned to this (see Table 3).

The first challenge is a lack of awareness regarding the unfair advantage they possess by being part of an established manufacturing company (C.1) which was neglected by some of the interviewed companies. This typically also impacts the concretization of the objective negatively. Another challenge is the lack of awareness of evolutionary or maturity stages of a CV unit (C.2). Almost all units first go through an initial

phase of establishing processes and structures, exploring new fields of innovation, and collecting ideas before projects can be refined, developed, or even scaled. The lack of awareness of such development stages usually manifests itself in the application of inappropriate performance metrics that are completely unsuitable for behavioural control. This is closely related to the third challenge, which is that existing goals or metrics from the core are applied to CV units. This may reflect, among other things, the fact that incremental innovations are preferred to radical ones and, at the same time, expectations are disappointed (C.3). Furthermore, CV units often find it difficult to provide proof of performance at an early stage or to justify their existence to stakeholders in the core business early on – especially in the case of a long-term orientation (C.4).

Table 3: Challenges and Success Factors for the SPMM Phase "Target and Plan"

Main Challenge: C. Lack of operationalization of the mandate hinder effective management of the unit			
Challenges		Potential Success Factors	
C.1	Insufficient understanding of unfair advantages and its potential uses	C.S1	Concretization of goals with targeted use of the company's unfair advantage
C.2	Exaggerated expectations due to lack of consideration of the unit's development	C.S2	Evolution stage-specific targets - as quantitative as possible
C.3	Lack of adaptation of goals for the characteristics of radical innovations	C.S3	Project-specific adaptation of the control system in line with the business model
C.4	Difficulty in proving performance at an early stage, or in justifying the existence	C.S4	Early demonstration of success stories through "low-hanging-fruits" first

For the concretization of the mission in goals, the following potential success factors can be derived from the study. Firstly, identifying the unfair advantage and considering it in goal setting increases the likelihood of good performance (C.S1). Additionally, there is a need for evolution or maturity-specific goal setting that is as quantitative and actionable as possible (C.S2). The control and key performance indicator systems for projects must also be adapted to the respective project setting and in consideration of project phase-specific objectives (C.S3). It also makes sense to consider the various aspects of a business model (i.e., desirability, feasibility, viability) instead of purely financial KPIs. In order to demonstrate the performance of the CV unit at an early stage, specific attention should be paid to "low-hanging fruits" and opportunities (C.S4). Such projects with a high likelihood of success are well suited to justify existence to skeptics in the core business.

4.3 Execute and Adjust

There are two main challenges in the operational execution of projects: Inadequate frameworks for project advancement (D) and lack of agility (E) with three related aspects each. The respective challenges and potential success factors are summarized in Table 4.

The first main challenge relates to creating the right framework conditions for CV success and progress. This includes first of all ensuring competencies and know-how for CV activities by finding and retaining a high-performing team that is capable of working with radical innovation. This refers both to leadership or coaching roles that remain at the core of the CV unit (D.1). Besides that, project processing is also impacted and delayed by split resources between core and CV unit, and low priority of radical innovation over ongoing business (D.2). Additionally, there is often a lack of ownership, capacity, or willingness in the core business to cooperate on radical innovation projects (D.3). This includes the effects of the not-invented-here syndrome.

Potential success factors for the challenges to create the right framework conditions are as follows. For the core team of the CV unit, external recruiting of experts or qualified employees who have the right mindset

for the tasks is a good option (D.S1). In order to avoid the limited availability of personnel due to split heads, it is suitable on the one hand to temporarily release the respective employees from their operational duties in order to enable focused project work. In some cases, motivated students can write their thesis or spend their internship on work on innovation projects, especially in early phases (D.S2). Regarding interactions with the core business, it is advisable to identify the relevant stakeholders in the parent company for the project and to involve them at an early stage (D.S3).

Table 4: Challenges and Success Factors for the SPMM Phase "Execute and Adjust"

Main Challenge: D. Inefficient organizational structure slows down project advancement			
Challenges		Potential Success Factors	
D.1	Difficulty in finding and keeping a high performing team fit for radical innovation	D.S1	Qualified fixed CVU staff, with explorative mindset; external recruiting of experts
D.2	Limited resources and availability due to split heads	D.S2	Full-time focus on project work, and use of external human potential
D.3	Lack of willingness for cooperation in the parent company	D.S3	Identification and targeted involvement of relevant and suitable stakeholders
Main Challenge: E. Lack of agility limits efficiency and control			
Challenges		Potential Success Factors	
E.1	Poor handling of high uncertainty/ poor plannability of discontinuous innovations.	E.S1	Professional agile project management, incl. experimentation and error culture
E.2	Lack of radicality or marketability due to low customer centricity	E.S2	Fast and continuous validation and adjustments/pivots in the development
E.3	Insufficient knowledge management/ high dependence on individual experience	E.S3	Active knowledge transfer as part of the projects or explicit knowledge management

The second main challenge relates to agility in the execution of projects (see Table 5). On the one hand, this manifests itself in a difficult handling of the high uncertainty or plannability of radical innovations and, closely related to this, the viewing of terminated projects as failure (E.1). On the other hand, this also manifests itself in a deficiency of radicalness or marketability due to a lack of customer-centricity and -interaction (E.2). In particular, this manifests itself in a lack of realignment or abandonment in early phases. And finally, the dependence of the CV unit on individual experience and person-specific knowledge poses another challenge (E.3).

The study identified the following potential success factors. In the project work, attention should be paid to sound agile project management methods, which focus primarily on working on the highest risks and showstoppers in the very early stage, as well as on experimentation and on a culture of error (E.S1). With regard to customer-centricity, care should be taken to involve customers and experts from the very beginning and to ensure that hypotheses are continuously validated by these (E.S2). This should also result in the necessary pivots in the development process. To address the challenges in knowledge management, it is advisable to ensure fixed personnel who can build up and share knowledge and remain in the CV unit for a longer period of time (E.S3). In addition, project work should ensure that knowledge is actively shared (e.g., in retros or lessons learned sessions) or even made explicit via knowledge management (e.g., using digital tools/platforms).

4.4 Review and Assess

The review and assessment of projects in the context of CV units is also subject to two major challenges (see Table 6): the difficulties in setting up appropriate decision-making structures (F) and the lack of appropriate sets of criteria (G).

As already noted in previous sections, activities in the core business differ from CV activities above all in their uncertainty and lack of plannability, which is particularly noticeable at decision points. While in the core business, regular meetings with uniform structures and criteria can be scheduled in longer cycles, these structures are completely unsuitable for radical innovation projects (F.1). Additionally, the mindset of managers has an important impact. Since they often spend a significant part of their time on decisions about incremental innovations and the core operational business, they often find it difficult to make the change in mindset required for CV activities (F.2). In some cases, this manifests itself in inappropriate expectations of perfection or quality for the radical innovation projects. Furthermore, the novelty of the topics addressed in CV units leads to the fact that the decision-making body often lacks professional experience and thus assessment competence (F.3).

For the main challenge of poor decision-making structures, the following approaches have been identified: In order to cope with the unpredictability of CV projects and not to lose speed by waiting for regular meetings, it is suitable to obtain interaction and feedback with decision-makers in the core (usually top management) as needed (F.S1). This should be decoupled from decision meetings in the core due to the lack of comparability of activities. With regard to the mindsets of decision-makers, it is clear that preparation and briefing of managers before each decision point and targeted stakeholder management during the course of the project are potentially successful (F.S2). In order to enable a qualified assessment outside the project team, it is advisable to (partially) vary the composition of the decision-making body and to involve suitable experts (internal as well as external) (F.S3).

Table 6: Challenges and Success Factors for the SPMM Phase "Review and Assess"

Main Challenge: F. Poor decision-making structures			
Challenges		Potential Success Factors	
F.1	Lack of decision-making structures for radical innovation	F.S1	On-demand interaction with top management for decision-making – decoupled from core decision meetings
F.2	Mental switch for managing core operations vs. discontinuous innovation	F.S2	Briefing/preparation of decision makers, targeted stakeholder management.
F.3	Lack of assessment competence in the decision-making body	F.S3	(Partially) varying staffing of the decision-making body with relevant experts (internal & external)
Main Challenge: G. Lack of appropriate sets of criteria/ prerequisites for fact-based decisions			
Challenges		Potential Success Factors	
G.1	Lack of clarity for idea selection	G.S1	Derivation of clear selection criteria from strategic mandate in idea evaluation
G.2	Difficult comparability or standardized evaluation of innovations	G.S2	Strategic and adaptive control systems, objectification and transparency instead of KPI
G.3	Low acceptance of the new ideas in the core	G.S3	Fact-based decision-making
G.4	Lack of risk diversification and over-rating of individual projects	G.S4	Portfolio approach (e.g., regarding strategic goal, horizon, innovation field, ...)

The review and assessment of CV activities regularly leads to challenges not only in terms of structures but also in the decision-making process itself. The first natural decision point is usually the idea assessment, which is often the first challenge, especially when there is a large number of ideas collected (G.1). This is especially the case if in earlier phases of performance management, the mission was not defined clearly and operationalized well enough, making it difficult to find objective criteria. Furthermore, the lack of comparability of projects and thus the quasi-non-existent standardization of evaluation criteria pose a challenge for many decision-makers (G.2). This in turn leads to arguments being based primarily on opinions or gut feelings (G.3). Moreover, with little experience with CV, there is a tendency in some companies to overestimate the likelihood of success of individual projects. This is possibly reflected in the attachment to personal pet projects and insufficient risk diversification (G.4).

For idea evaluation, the derivation of criteria from the mission and its operationalization in innovation or search fields can be taken up as a potential success factor (G.S1). According to the interviews, the lack of comparability of projects can be addressed with the help of project-specific performance measurement systems (e.g., using Objectives and Key Results, OKRs). The insights generated as part of the agile and customer-centric project approach also serve to objectify decisions (G.S2). In this way, rigid KPIs are replaced by transparency in decision-making situations. With regard to opinion-based discussions, the identification and preparation of figures, data and facts on relevant milestones by the project team can help to qualify and prepare decisions accordingly (G.S3). Lastly, the lack of risk diversification can be countered by effective portfolio management (G.S4). In doing so, a balance of the innovation portfolio should be aimed for according to the mission and/or concretization (e.g., according to maturity, fields of innovation, novelty, ...).

4.5 Align System and Context

In the second strategic element of the SPM and last phase “Align System and Context”, there are two main challenges. One being an insufficient autonomy with too little creative freedom (H) and the other one being a lack of suitable internal and external networks to leverage by the CV unit (I). Challenges and potential success factors for both main challenges can be found in Table 8.

The first main challenge is based on three aspects which predominantly apply to units that depend on collaboration with the core business: For established companies it is often challenging to create the right systematic conditions and processes for CV (H.1). These include, for example, appropriate premises or budgeting as well as decision-making or service processes (e.g., HR, purchasing, etc.). Furthermore, the associated inertia and risk aversion in the core business pose an additional challenge, especially for units that are dependent on the use of personnel resources of the parent company (H.2). This is often referred to as a culture clash. Besides that, it is often difficult for employees in the CV unit to enforce their project or the activities required for it with employees or managers at the core (H.3).

To address the outlined challenges, participants pointed out that structures, processes, and resources are continuously adapted to meet specific needs on the basis of experience (H.S1). This can also depend on the maturity of the CV unit. Additionally, to avoid the inhibiting structures from the core, an appropriate degree of autonomy is selected that still ensures sufficient access to the necessary resources. The maintenance of the relevant interfaces plays a crucial role (H.S2). Moreover, in order to be able to implement CV projects even if they are dependent on people in the core business, a direct connection with top management is a potential success factor (H.S3). In this respect, active support from such powerful promoters is particularly crucial.

Table 8: Challenges and Success Factors for the SPMM Phase "Align System and Context"

Main Challenge: H. Insufficient autonomy and creative freedom of the CVU hinder innovation			
Challenges		Potential Success Factors	
H.1	Lack of optimal systematic conditions (e.g. resources, processes)	H.S1	Needs-based adaptation of structures/ processes/ resourcing based on experience
H.2	Culture clash: Inertia and risk aversion at the core	H.S2	Right level of autonomy, maintenance of relevant interfaces
H.3	Lack of leverage/assertiveness (for projects) from CVU towards employees in the core	H.S3	Top management pull and active support from powerful promoters
Main Challenge: I. Lack of a suitable internal and external network limits outcome			
Challenges		Potential Success Factors	
I.1	Lack of competencies/ mindset for discontinuous innovating in project work.	I.S1	Entrepreneurial project team: external recruiting of experts, active outsourcing of tasks
I.2	Difficulty in building and using relevant networks	I.S2	Consideration of the network in personnel selection and active network maintenance,
I.3	Insufficient perspectives/ diverse viewpoints	I.S3	Diversity in the project team for broader perspective and representation of needs

The second main challenge relates to building and leveraging a suitable network of internal and external partners. In this context, a lack of capabilities for radical innovation and the accompanying mindset regarding project managers and team members who operationally support CV projects can be a challenge (I.1). Furthermore, insufficient build-up or use of relevant networks also limits the unit's competence and therefore poses a challenge for CV units (I.2). Lastly, ensuring the necessary diversity within the CV unit or project teams can also be a challenge and may lead to neglecting functional or market perspectives (I.3).

Potential success factors for the challenges to acquire and maintain a suitable network are as follows. To ensure the capabilities for radical innovation, the mindset should be considered when building the project team. Additionally, the targeted internal identification of motivated or capable employees (e.g., via idea competitions or similar) can be promising (I.S1). In order to be able to access competencies outside the CV unit or even company boundaries (I.S2), it is advisable on the one hand to pay attention to the existing networks when recruiting personnel and to engage in targeted network maintenance (both with internal and external experts). Another option is to outsource (development) tasks outside existing competencies to external partners or service providers. In order to include a sufficiently broad range of perspectives in development activities, and to increase project success, attention should be paid to diversity in the teams (I.S3) - both professionally and personally.

5. Discussion

For "Define and Engage", the outline of the study is that defining the mission of the CV unit is an often poorly executed task that has many effects on the subsequent phases of performance management. Thus, it is highly important for the performance of CV units since it enables them to align all its processes and structures towards this mission. Not executing the task with the appropriate diligence can lead to unfocused actions within the CV unit and low acceptance of the CV unit within the corporate. This is also reflected in respective literature. Mission statements are mentioned as being directional for some units' history [5, 39]. Also, they are acknowledged to be helpful for shaping employees' understanding of CV unit's tasks [40]. Covin et al. examined that shifting missions have a negative impact on CV-project performance [41].

Furthermore, it should be mentioned that the literature supports the provision of clear exit strategies at an early stage (during business plan creation) as an important factor which is in line with the present study's findings [44]. However, the importance of the task to evaluate a company's idea of value creation and or the purpose of the CV unit to avoid fuzzy missions seems to be overlooked by many practitioners.

With respect to "Target and Plan" as an element of performance management, the present study shows that the targets and planning for the CV unit as a whole need to adapt to the mission and the CV unit's maturity instead of using established KPIs of the core business. Literature supports this insight and argues that targets should be multidimensional and can be categorized into financial or operational targets as well as targets for overall effectiveness [42]. Once the CV unit's activities reach a certain maturity and market readiness, financial targets are very effective [43]. This is consistent with the study's findings – those units that set quantitative or even financial goals as early as possible seemed particularly successful.

In the second operative phase, "Execute and Adjust," results show that CV units often lack the right conditions for a successful progress of projects as they have insufficient agility. Literature commonly acknowledges the flexibility and enhanced development time of separating innovation activities with more agile methods in CV units [39, 45, 46] but so far, there is no unanimous opinion on the single right degree of corporate management control. Literature also discussed the increasing importance of design thinking methods in the context of radical innovations due to its enhanced flexibility, speed and customer focus [52, 53] which is also in line with the study's findings. With respect to the lack of competencies, literature emphasizes the positive effect of internal knowledge sharing [41] on the teams ability to react on the volatile environment [30, 59] or mitigate an unclear mission and targets [41]. Personal internal contacts and collaborations for knowledge transfer are of high value to nurture learning mechanisms [59] and build a culture of innovation [30]. Sethi and Iqbal however mention that the effectiveness of a culture that supports learnings is limited when CV units' members do not have the authority to change the system and processes according to their experiences [61].

For the last operative phase "Review and Assess", results showed that two major challenges are poor decision-making structures and a lack of appropriate metrics for fact-based decisions. The literature shows that especially when companies put pressure on CV units to produce quick results, this leads to either low radicality or low performance [48, 54]. On the project level, according to the findings of this study, it is also important to set differentiated and individual targets and work with management methods such as OKRs. In this context literature emphasizes the freedom from rigid deliverables (cf. stage-gate processes) towards more agile methods [55]. Literature extensively discusses advantages and disadvantages of autonomous decisions in CV units and come to the conclusion that decisions should be made by stakeholders who have the greatest experience and insights into the respective topic [56]. In many cases, this leads to either the project team or external experts being most suitable decision makers.

For the last phase "Align System and Context", results show that it is especially challenging to find an appropriate level of autonomy and to deploy suitable internal and external networks. On the one hand high levels of corporate control may enable the early identification of unsuccessful projects [47, 48] or enable synergies between the core and the CV unit [18]. On the other hand too close alignment can hinder radicality [45, 46] and reduce innovation speed as CV units' demands might be treated with lower priority [49, 50]. In case of shared personnel resources this stems from the resistance of corporate managers to free their most effective in favor of CV activities [51]. Literature argues that often especially in the beginning of a CV units existence, structures are more influenced by corporate processes and need some time to adjust their setup for the new requirements [57]. Selig et al. suggests to find short-cuts in slow processes [58]. One of the strong enablers in this context is the existence of networks for radical innovation projects [59, 60] provided especially by managers.

The paper offers practical insights into the challenges and corresponding solution approaches in the operation of CV units, particularly for Western European companies. It makes a contribution to the scientific literature in particular by examining the area of CV from the perspective of performance management. Still, the study has some limitations. First, the sample of the study was centred on western European, especially German corporates. Hence, the applicability and generalisability of the insights to CV units from other cultures and market settings should be tested by future research. Furthermore, the number of study participants and the interview approach of the study does not allow for quantitative statements on the weight of each statement based on occurrence of the mentioned challenges and success factors. Hence, additional studies with a greater sample and more structured interview guide could be helpful to either confirm or contradict the experiences of the study participants. Additionally future research should validate the identified potential success factors empirically with the help of quantitative studies.

References

- [1] J. A. Schumpeter, *Capitalism, socialism, and democracy*. London, New York: Routledge, 1994.
- [2] M. H. Meyer and T. J. Marion, "Innovating for Effectiveness: Lessons from Design Firms," *Research-Technology Management*, vol. 53, no. 5, pp. 21–28, 2010, doi: 10.1080/08956308.2010.11657647.
- [3] J. Birkinshaw and S. A. Hill, "Corporate Venturing Units," *Organizational Dynamics*, vol. 34, no. 3, pp. 247–257, 2005, doi: 10.1016/j.orgdyn.2005.06.009.
- [4] J. Hauschildt, S. Salomo, C. Schultz, and A. KOCK, *Innovationsmanagement*, 7th ed. München: Franz Vahlen, 2022.
- [5] T. A. Finkle, "Corporate Entrepreneurship and Innovation in Silicon Valley: The Case of Google, Inc," *Entrepreneurship Theory and Practice*, vol. 36, no. 4, pp. 863–887, 2012, doi: 10.1111/j.1540-6520.2010.00434.x.
- [6] K. Gaubinger, *Hybrides Innovationsmanagement für den Mittelstand in einer VUCA-Welt: Vorgehensmodelle – Methoden – Erfolgsfaktoren – Praxisbeispiele*, 1st ed. Berlin, Heidelberg: Springer Berlin Heidelberg, 2021. [Online]. Available: <http://nbn-resolving.org/urn:nbn:de:bsz:31-epflicht-1963046>
- [7] W. J. Abernathy and K. B. Clark, "Innovation: Mapping the winds of creative destruction," *Research Policy*, vol. 14, no. 1, pp. 3–22, 1985, doi: 10.1016/0048-7333(85)90021-6.
- [8] J. G. March, "Exploration and Exploitation in Organizational Learning," *Organization Science*, vol. 2, 1, Special Issue: Organizational Learning: Papers in Honor of (and by) James G. March, pp. 71–87, 1991.
- [9] M. J. Benner and M. L. Tushman, "Exploitation, Exploration, and Process Management: The Productivity Dilemma Revisited," *AMR*, vol. 28, no. 2, pp. 238–256, 2003, doi: 10.5465/AMR.2003.9416096.
- [10] C. M. Christensen, *The innovator's dilemma: When new technologies cause great firms to fail*. Boston, Mass.: Harvard Business School Press, 1997.
- [11] G. S. Lynn, J. G. Morone, and A. S. Paulson, "Marketing and Discontinuous Innovation: The Probe and Learn Process," *California Management Review*, vol. 38, no. 3, pp. 8–37, 1996, doi: 10.2307/41165841.
- [12] R. Leifer, G. C. O'Connor, and M. Rice, "Implementing radical innovation in mature firms: The role of hubs," *AMP*, vol. 15, no. 3, pp. 102–113, 2001, doi: 10.5465/ame.2001.5229646.

- [13] R. Stringer, "How to Manage Radical Innovation," *California Management Review*, vol. 42, no. 4, pp. 70–88, 2000, doi: 10.2307/41166054.
- [14] G. Schuh, L. A. Budweiser, and F. Lademann, Eds., *Corporate Venturing as Catalyst for Transformation? Towards a Research Agenda*: IEEE, 2022.
- [15] R. G. Cooper, "What's Next? After Stage-Gate," *Research-Technology Management*, vol. 57, no. 1, pp. 20–31, 2014, doi: 10.5437/08956308X5606963.
- [16] J. Buvat, B. Gilchrist, E. Turkington, S. KVJ, and A. Ghosh, "The discipline of innovation: Making sure your innovation center actually makes your organization more innovative," *Digital Transformation Institute*, 2017.
- [17] Z. Block, "Can Corporate Venturing Succeed?," *Journal of Business Strategy*, vol. 3, no. 2, pp. 21–33, 1982, doi: 10.1108/eb038963.
- [18] P. Dauderstädt, *Success Factors in Strategic Corporate Venturing*. Berlin, 2013.
- [19] T. Gutmann, "Harmonizing corporate venturing modes: an integrative review and research agenda," *Manag Rev Q*, vol. 69, no. 2, pp. 121–157, 2019, doi: 10.1007/s11301-018-0148-4.
- [20] F. Blindenbach-Driessen and J. van den Ende, "The Locus of Innovation: The Effect of a Separate Innovation Unit on Exploration, Exploitation, and Ambidexterity in Manufacturing and Service Firms," *Journal of Product Innovation Management*, vol. 31, no. 5, pp. 1089–1105, 2014, doi: 10.1111/jpim.12146.
- [21] F. Lau and L.-T. Münch, "Konzerne auf den Spuren von Startups 2021: Von Spielwiesen zu Digitalen Geschäftseinheiten und Innovationsplattformen," Infront Consulting, 2021. Accessed: Sep. 18 2023. [Online]. Available: <https://www.infront-consulting.com/relaunch20/wp-content/uploads/2021/06/Konzerne-auf-den-Spuren-von-Startups-2021.pdf>
- [22] Möller, K., Wirnsperger, F., & Gackstatter, T., "Performance Management - Konzept, Erfahrungen und Ausgestaltung einer neuen Disziplin," *Controlling: Zeitschrift für erfolgsorientierte Unternehmenssteuerung*, vol. 27, no. 2, pp. 74–80, 2015.
- [23] C. Demartini, "Innovation and the Performance Management System. Literature Review," *Performance Management Systems*, pp. 89–115, 2014, doi: 10.1007/978-3-642-36684-0_4.
- [24] T. Malmi and D. A. Brown, "Management control systems as a package—Opportunities, challenges and research directions," *Management Accounting Research*, vol. 19, no. 4, pp. 287–300, 2008, doi: 10.1016/j.mar.2008.09.003.
- [25] R. S. Kaplan and D. P. Norton, "The balanced scorecard - Measures that drive performance," *Harvard Business Review*, vol. 70, no. 1, pp. 71–79, 1992.
- [26] A. Ferreira and D. Otley, "The design and use of performance management systems: An extended framework for analysis," *Management Accounting Research*, vol. 20, no. 4, pp. 263–282, 2009, doi: 10.1016/j.mar.2009.07.003.
- [27] V. Chiesa, F. Frattini, V. Lazzarotti, and R. Manzini, "Performance measurement in R&D: exploring the interplay between measurement objectives, dimensions of performance and contextual factors," *R&D Management*, vol. 39, no. 5, pp. 487–519, 2009, doi: 10.1111/j.1467-9310.2009.00554.x.
- [28] M. Bianchi, G. Marzi, and M. Guerini, "Agile, Stage-Gate and their combination: Exploring how they relate to performance in software development," *Journal of business research*, vol. 110, pp. 538–553, 2020, doi: 10.1016/j.jbusres.2018.05.003.

- [29] L. A. d. V. Gomes, A. L. F. Facin, and F. Hourneaux Junior, "Building a bridge between performance management, radical innovation, and innovation networks: A systematic literature review," *Creat Innov Manag*, vol. 28, no. 4, pp. 536–549, 2019, doi: 10.1111/caim.12348.
- [30] L. Agostini, A. Nosella, and R. Filippini, "Users and radical innovation performance: the moderating role of the organisational context," *Technology Analysis & Strategic Management*, vol. 28, no. 7, pp. 798–810, 2016, doi: 10.1080/09537325.2016.1156667.
- [31] K. E. Newcomer, H. P. Hatry, and J. S. Wholey, Eds., *Handbook of Practical Program Evaluation*, 4th ed. s.l.: Jossey-Bass, 2015.
- [32] S. Harvey-Jordan and S. Long, "The process and the pitfalls of semi-structured interviews," *Community Practitioner*, vol. 74, no. 6, p. 219, 2001.
- [33] F. Kohlbacher, "The Use of Qualitative Content Analysis in Case Study Research," 7, vol. 1, 2006.
- [34] W. C. Adams, "Conducting semi-structured interviews," *Handbook of practical program evaluation*, pp. 492–505, 2015.
- [35] D. Smith Nightingale and S. B. Rossman, "Collecting Data in the Field," in *Essential Texts for Nonprofit and Public Leadership and Management Ser, Handbook of Practical Program Evaluation*, K. E. Newcomer, H. P. Hatry, and J. S. Wholey, Eds., 4th ed., s.l.: Jossey-Bass, 2015, pp. 445–473.
- [36] M. Meuser and U. Nagel, *ExpertInneninterviews - vielfach erprobt, wenig bedacht: ein Beitrag zur qualitativen Methodendiskussion*. Opladen: Westdt. Verl., 1991.
- [37] D. Goodrick and P. J. Rogers, "Qualitative Data Analysis," in *Essential Texts for Nonprofit and Public Leadership and Management Ser, Handbook of Practical Program Evaluation*, K. E. Newcomer, H. P. Hatry, and J. S. Wholey, Eds., 4th ed., s.l.: Jossey-Bass, 2015, pp. 561–595.
- [38] S. Elo and H. Kyngäs, "The qualitative content analysis process," *Journal of advanced nursing*, vol. 62, no. 1, pp. 107–115, 2008, doi: 10.1111/j.1365-2648.2007.04569.x.
- [39] T. Weiblen and H. W. Chesbrough, "Engaging with Startups to Enhance Corporate Innovation," *California Management Review*, vol. 57, no. 2, pp. 66–90, 2015, doi: 10.1525/cm.2015.57.2.66.
- [40] B. Forés and C. Camisón, "Does incremental and radical innovation performance depend on different types of knowledge accumulation capabilities and organizational size?," *Journal of business research*, vol. 69, no. 2, pp. 831–848, 2016, doi: 10.1016/j.jbusres.2015.07.006.
- [41] J. G. Covin, R. P. Garrett, J. P. Gupta, D. F. Kuratko, and D. A. Shepherd, "The Interdependence of Planning and Learning Among Internal Corporate Ventures," *Entrepreneurship Theory and Practice*, etap.12265, 2018, doi: 10.1111/etap.12265.
- [42] S. Gerschewski and S. S. Xiao, "Beyond financial indicators: An assessment of the measurement of performance for international new ventures," *International Business Review*, vol. 24, no. 4, pp. 615–629, 2015, doi: 10.1016/j.ibusrev.2014.11.003.
- [43] K. L. Johnson, "The Role of Structural and Planning Autonomy in the Performance of Internal Corporate Ventures," *Journal of Small Business Management*, vol. 50, no. 3, pp. 469–497, 2012, doi: 10.1111/j.1540-627X.2012.00363.x.
- [44] J. Tidd, J. R. Bessant, and K. L. R. Pavitt, *Managing innovation: Integrating technological, market and organizational change*, 3rd ed. Chichester: Wiley, 2005.
- [45] K. Hussinger, J. M. Dick, and D. Czarnitzki, "Ownership concentration and innovativeness of corporate ventures," *Research Policy*, vol. 47, no. 2, pp. 527–541, 2018, doi: 10.1016/j.respol.2018.01.008.

- [46] J. H. Burgers and J. G. Covin, "The contingent effects of differentiation and integration on corporate entrepreneurship," *Strat. Mgmt. J.*, vol. 37, no. 3, pp. 521–540, 2016, doi: 10.1002/smj.2343.
- [47] R. Hirte, "The Role of Middle Managers in the Implementation of a Corporate Incubator: A Case Study in the Automotive Sector," *TIM Review*, vol. 8, no. 7, pp. 31–39, 2018, doi: 10.22215/timreview/1169.
- [48] E. Maine, "Radical innovation through internal corporate venturing: Degussa's commercialization of nanomaterials," *R&D Management*, vol. 38, no. 4, pp. 359–371, 2008, doi: 10.1111/j.1467-9310.2008.00521.x.
- [49] G. Schuh, F. Vogt, and M. Künstner, "Transferring Innovation From Corporate Incubators To Its Parent Company: Derivation Of Requirements For The Interfaces," 2020.
- [50] J. Gonthier and G. M. Chirita, "The role of corporate incubators as invigorators of innovation capabilities in parent companies," *J Innov Entrep*, vol. 8, no. 1, 2019, doi: 10.1186/s13731-019-0104-0.
- [51] A. Branstad, "A study of management tasks and stakeholders in a hybrid corporate incubator," *European Journal of Innovation Management*, vol. 13, no. 3, pp. 294–312, 2010, doi: 10.1108/14601061011060139.
- [52] P. Bicen and W. H. Johnson, "Radical Innovation with Limited Resources in High-Turbulent Markets: The Role of Lean Innovation Capability," *Creativity and Innovation Management*, vol. 24, no. 2, pp. 278–299, 2015, doi: 10.1111/caim.12120.
- [53] C. Diderich, *Design Thinking for Strategy: Innovating Towards Competitive Advantage*. Cham: Springer International Publishing AG, 2020.
- [54] H. A. Søndergaard, M. P. Knudsen, and N. S. Laugesen, "The Catch-22 in Strategizing for Radical Innovation," *Technology Innovation Management Review*, vol. 11, no. 3, pp. 4–16, 2021.
- [55] F. Fecher, J. Winding, K. Hutter, and J. Füller, "Innovation labs from a participants' perspective," *Journal of business research*, vol. 110, pp. 567–576, 2020.
- [56] J. Gard, G. Baltes, D. Wehle, and B. Katzy, "An integrating model of autonomy in corporate entrepreneurship," *013 International Conference on Engineering, Technology and Innovation (ICE) & IEEE International Technology Management Conference*, pp. 1–14, 2013, doi: 10.1109/ITMC.2013.7352658.
- [57] S. Ferriani, E. Garnsey, and G. Lorenzoni, "Continuity and change in a spin-off venture: the process of reimprinting," *Industrial and Corporate Change*, vol. 21, no. 4, pp. 1011–1048, 2012, doi: 10.1093/icc/dts001.
- [58] C. J. Selig, T. Gasser, and G. H. Baltes, "How Corporate Accelerators Foster Organizational Transformation: An Internal Perspective," in *2018 IEEE International Conference on Engineering, Technology and Innovation (ICE/ITMC)*, 2018.
- [59] B. Becker and O. Gassmann, "Corporate Incubators: Industrial R&D and What Universities can Learn from them," *J Technol Transfer*, vol. 31, no. 4, pp. 469–483, 2006, doi: 10.1007/s10961-006-0008-6.
- [60] S. Gerlach and A. Brem, "What determines a successful business incubator? Introduction to an incubator guide," *IJEV*, vol. 7, no. 3, p. 286, 2015, doi: 10.1504/IJEV.2015.071486.
- [61] R. Sethi and Z. Iqbal, "Stage-Gate Controls, Learning Failure, and Adverse Effect on Novel New Products," *Journal of Marketing*, vol. 72, no. 1, pp. 118–134, 2008, doi: 10.1509/jmkg.72.1.118.