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An Empirical Investigation of the German Business Landscape**

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Exploring the Parallel Use of Multiple Corporate Entrepreneurship Units

– An Empirical Investigation of the German Business Landscape

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Abstract — Corporate Entrepreneurship (CE) units have become an increasingly important part of established companies' development activities enabling them to also create more discontinuous innovations. As a result, companies have developed and implemented different forms of CE units, such as corporate accelerators, incubators, startup supplier programs, and corporate venture capital. Driven by the need to innovate, companies have even begun to use multiple CE units simultaneously. However, this has not been empirically investigated yet. Thus, with this study, we aim to shed some light on this by investigating the parallel use of multiple CE units in the German business landscape. We conducted an extensive desk research, combining, coding, and analyzing different sources. We found that 55 out of 165 large established companies have multiple CE units, which allowed us to characterize the parallel use and identify differences and similarities, e.g., in terms of industry, company size, and CE forms implemented. We conclude by presenting different implications for both practice and research and by pointing out directions for future research.

Keywords — *Corporate Entrepreneurship, Support Units, Combinations, Co-Specialization, German Industry*

I. INTRODUCTION

The present time shows very clearly how quickly and profoundly things can change, challenging almost everything that has been established. Radical new technologies are emerging at an accelerating pace, and customer requirements are constantly changing [1]. Established companies must therefore create discontinuous innovations to transform their business and remain relevant in the globalized business environment [2, 3]. However, established companies' structures, processes, and ways of working are optimized for the efficient development and production of their products and services [4, 5], so they need to implement alternative structures in which they can pursue more entrepreneurial approaches to innovation creation. This intended approach to foster entrepreneurial mindset and action in an established organizations is commonly associated with Corporate Entrepreneurship (CE) [6].

While CE used to be individual corporate venturing initiatives (i.e., corporate ventures, venture capital investments), since the 2000s companies have also developed new forms of CE activities to systematically initiate and support a larger number of innovative teams [7]. CE support units, such as corporate incubators [8], corporate accelerators [9], and corporate venture capital [10] emerged even though they had not been examined much at the time and thus hardly any best practices existed. What makes the implementation of such CE units even more challenging for established companies is the lack of know-how, competencies [11], and management attention [12] to implement CE in a way that also fits their business. As a result, in the early stages, the use of CE units followed a more experimental approach [12, 13], setting up not only very different, but sometimes even quite similar units to find out which approach was best suited to achieve their innovation goals. This led to the emergence of even more forms of CE units, such as venture client programs [14] or corporate company builders [15].

The increasing use of CE in practice, accompanied by more and more research, has led to a better understanding of how to use CE units most effectively in terms of their design [16–18], integration into the core organization [19], or the innovation outcomes to be achieved [20]. This has provided the basis for the creation of best practices and some consolidation of CE forms, allowing research to distinguish specific archetypes of CE unit specialization [20, 21].

Practice shows that established companies often implement multiple, more or less dependent CE units within the same organization, which is due to different reasons [22]. Thus, companies not only try to exploit the innovation potential in different regions through better access to talents and/or customers, but also use the respective specializations of the different CE forms to optimally support the different maturity levels of innovations (seed, early, later) or to generate different types of innovations (e.g., product, service, process, business model). Such reasons have led many companies to demonstrate different combinations of CE units, but to date there is little research on such parallel use of CE units [22].

This study therefore aims to shed some light on the use of multiple CE units by established companies by providing an overview and more detailed insights into this recent phenomenon as well as its implications. To this end, we investigated 165 of the largest established German companies in order to identify and characterize the relevant companies and their CE units. We highlight differences and similarities in the use of multiple CE units, e.g., in terms of the companies' industry, company size, and more detailed aspects such as the CE forms, activities, and outputs pursued. In addition, we use two exemplary cases to illustrate approaches to the parallel use of multiple CE units. Finally, we discuss our findings and their managerial and scientific implications, and present several avenues for future research.

II. THEORETICAL BACKGROUND

A. The Evolving Use of CE

Within its relatively young age, corporate entrepreneurship (CE) has undergone quite an evolution [23–25]. To date, it has seen different research approaches, emerging and again disappearing terminologies, as well as different perspectives that can be taken in its analysis. In addition to the theoretical conceptualization and investigation, the actual use of the CE in practice has also changed significantly over the years.

First, companies introduced CE into their organization by creating their own venture teams [26, 27] and investing in or acquiring startups [28]. Then, companies began to foster entrepreneurial thinking and behavior throughout the organization [29–31] in an attempt to strategically renew their organization [19, 32, 33]. These two general approaches are commonly referred to as corporate venturing and strategic entrepreneurship [34]. With the growing understanding and recognition of the potential of CE, companies began to establish dedicated CE units to systematically support innovation projects from either inside or outside the organization [20, 21, 35]. Eventually, CE became a fairly established part of companies' innovation activities, leading to the development of specific CE strategies [36, 37] to deploy CE units in a comprehensive and targeted manner to achieve specific innovation goals.

B. Different Forms of CE Support Units

The initially experimental approach of companies to develop CE units [12, 13] that could potentially serve their specific innovation goals resulted in a heterogeneous landscape of different forms of CE units. When several companies claimed to use a particular CE form, a closer look revealed that the implemented approaches differed considerably. Thus, researchers began to describe the forms of the CE units they studied along characterizing parameters such as locus of opportunity [38], supported idea maturity [9], type of support, and program duration [8, 17]. In doing so, they provided reference points for a clearer distinction of individual forms of CE.

Some researchers have taken a different approach, looking not just at single CE forms, but at multiple forms of CE, trying to find dimensions of characteristics to categorize the different and quite heterogeneous forms of CE units. For example, by screening the existing CE literature, Gutmann [21] derives a 3x3 matrix using the two established dimensions of prioritization of objectives [39, 40] and innovation flow direction [41, 42]. Here, he distinguishes between nine types

of CE units that follow a more strategic, financial, or balanced approach in combination with either an inside-in, inside-out, or outside-in flow of the innovation idea. Starting from an empirical approach, Selig [20] created a framework that differentiates different CE unit designs, which he positions in relation to each other along the existing dimension of locus of opportunity [39] and focus of support, which he derived from the data. Thereby, he distinguishes a total of twelve internally and externally oriented CE units, which are either more focused on the enabling of employees and the organization or on executing ideas in terms of new business creation. In addition, he provides a very detailed description of each CE form using 15 design elements.

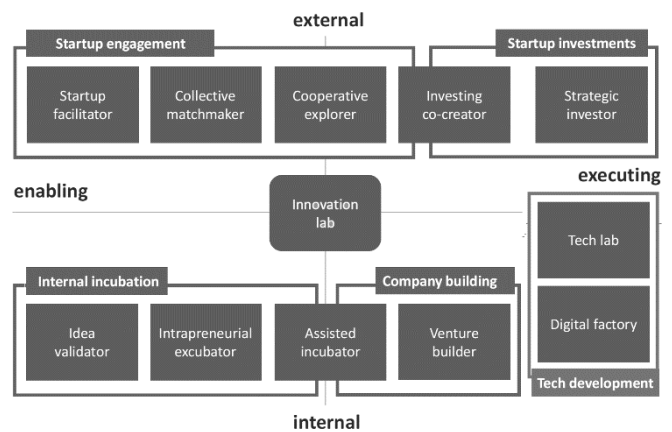


Figure 1: Overview of forms of CE units according to Selig (2021)

C. Parallel Use of Multiple CE Units

Established companies have different reasons for implementing multiple CE units in parallel [22]. Some companies take a more deliberate approach and implement CE units purposefully, e.g., to leverage the innovation potential of additional regions and markets, to pursue different types of innovation (product, service, process, ...) or to specifically support different stages of idea maturity (seed, early, later). Other companies have allowed CE units to emerge, i.e., they are based less on overall strategic motives than, for example, on opportunistic and/or individual initiatives and the associated personal agendas of individual managers.

These are the reasons that have led an increasing number of companies to implement multiple CE units in parallel, however, only few studies have examined this. While some studies have highlighted the emergence of the phenomenon, they have not explored it further; however, they have called for future research to address it [21, 23]. Single studies started the discussion by proposing specific configurations of the simultaneously implemented CE units [43, 44], and indicating potential benefits resulting from an overarching interplay and corresponding management.

Some researchers also point out that appropriate management and coordination of multiple CE units could have synergistic effects [21, 23, 45, 46]. Accordingly, the realized innovation outputs of all units could even exceed the sum of the contributions of the individual units and thus achieve the overall innovation goals even better (e.g., in terms of effectiveness and/or efficiency). All in all, only a few scholars have addressed the parallel use of multiple CE units. This calls for more empirical research investigating this novel phenomenon, and we aim to provide an important foundation for such research.

III. METHOD

In this explorative study, we follow both a deductive and inductive approach, using parameters from the literature to investigate the unknown field of CE unit combinations. Therefore, we have combined, coded, and quantitatively analyzed data from different sources in order to gain insights to characterize the combinations of CE units within established German companies.

In order to conduct a consistent data collection, sampling, and analysis, we needed a common understanding of CE activities and CE units. We speak of CE activities when a company engages in the explorative incubation of new ideas, startup collaboration, venture building, or similar activities with entrepreneurial approaches. Other less entrepreneurial activities such as university cooperations or co-working spaces we do not consider to be CE activities and thus were not part of our study. Consequently, for us, a CE unit is a group of people (i.e., departments) or individuals that are assigned to carry out a specific CE activity at a specific location (which is reported as a separate unit by the company).

A. Data Collection

Previous research has not yet provided a detailed overview of companies and their CE activities, so we had to create this first. We started by using the 100 largest German companies in terms of their revenue. Further we expanded the population through an iterative approach using several third-party sources that each examined a limited number of innovation activities of German companies [47–51], which led us to some additionally relevant companies. Thus, we created a list of 165 companies across all different industries and representative of the German business landscape.

We were then able to process the resulting list and enrich it with information about their CE activities. In order to systematically collect the relevant data, we deductively derived different aspects that we wanted to find out to characterize the combinations of CE units. Thus, we identified several parameters that have been used in the existing literature [20, 39, 42], such as CE forms and their activities, locus of opportunity, innovation flow, supported idea stage, and targeted output. In addition, to get a better picture of the context of the companies and their CE units, we collected demographic data such as the industry and subsectors (based on the Industry Classification Benchmark (ICB) [52]), the number of employees, the location of the CE units, and the years of establishment/closure.

To identify CE units, we first systematically analyzed publicly available data, such as companies' websites, annual reports, press releases, and social media posts. We also used Google with different combinations of company names and search terms such as innovation unit, corporate venturing, intrapreneurship or startup collaboration. The lists of innovation units in the third-party sources were also partially helpful. Finally, we supplemented this with data from previous studies when we interviewed various German companies about their use and management of CE units.

To reduce subjectivity (especially of qualitative aspects) in this inductive data collection, data were coded independently by three researchers and then aggregated. During this process, certain discrepancies were discussed and a common assessment was agreed upon in all cases. This iterative process produced the final data set, which included both qualitative and quantitative data.

B. Data Sample

The data collection presented that not all 165 companies implemented multiple (so more than one) units, with several companies not having any CE units. After excluding those companies, we were ultimately able to identify 55 German companies from a variety of industries that operate two or more CE units. Those constituted the sample which we used to analyze the combinations and characteristics of multiple CE units.

C. Data Analysis

The analysis of the final dataset not only quickly led to first usable findings (i.e., the frequency of CE unit founding's between 2015 and 2020), but also helped us to evaluate relevant metrics that we could later collect in a quantitative, cross-industry analysis (including Pearson correlation analysis, which allowed us to discuss the relationships between company size and the number of CE units per company). Furthermore, initial analyses of individual cases allowed us to refine our search for additional necessary information, which allowed us to later compare multiple cases.

IV. FINDINGS & DISCUSSION

Our research shows that CE is an important tool for innovation in the German business landscape. Of the 165 large established companies analyzed, a total of 55 companies use two or more CE units in parallel.

A. Characterizing the Use of Multiple CE Units in the German Business Landscape

Our search for companies with multiple CE units yielded 55 companies that implemented a total number of 306 CE units. The number of CE units used varies from 2 to 15 parallel units, with an average of 5.6 CE units per company.

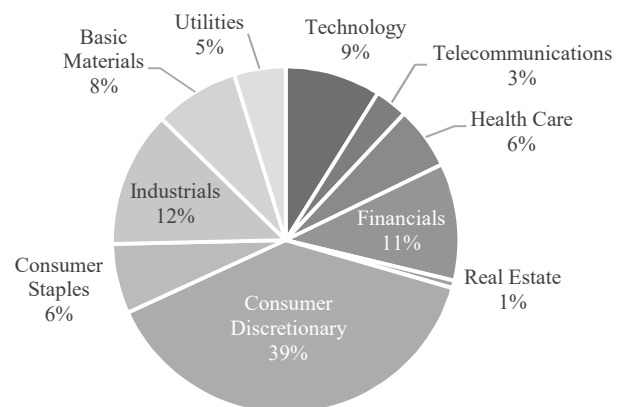


Figure 2: Shares of different industries in our dataset

Our dataset is composed of different industries, which highlights the cross-industry relevance of CE (see Figure 2). A large part of the dataset consists of manufacturers of industrial and consumer goods, including the automotive industry (which alone accounts for 40% of the total revenue of the German business landscape [53]).

A comparison of the parallel use of CE units in different industries reveals significant differences (see Figure 3). For example, in real estate there is only a maximum of 2 units, while in technology there are up to 15 units. We find that the number of units does not necessarily depend on the number of companies in the sample and that it is only a matter of how

many companies are identified before one of them uses many CE units. Accordingly, despite its small share in the sample, the technology sector has a relatively high average number of CE units. In addition, some differences in the use of CE units can also be explained by industry. In particular, manufacturing industries with technology-based products and services (e.g., technology, consumer discretionary, industrials) are more active in R&D and related innovation activities than other more service-oriented industries without a specific technology focus (e.g., real estate, utilities).

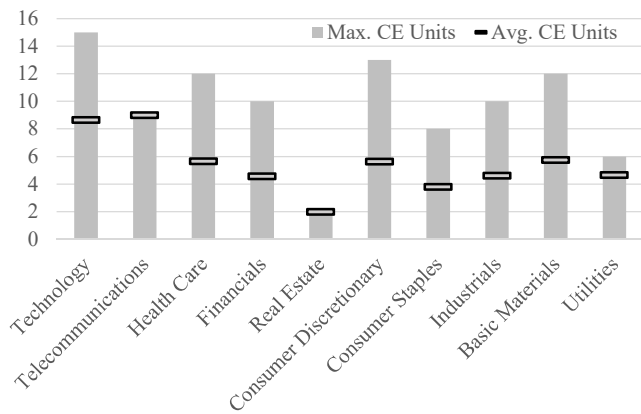


Figure 3: Maximum and average of CE units implemented by companies of different industries

The companies in our sample vary widely in terms of number of employees (see Figure 4), ranging from 6,000 for the 'smallest' to more than 670,000 for the largest. Nearly half of the companies have between 30,000 and 100,000 employees, and nearly a quarter each have between 10,000 and 30,000 or 100,000 and 300,000 employees.

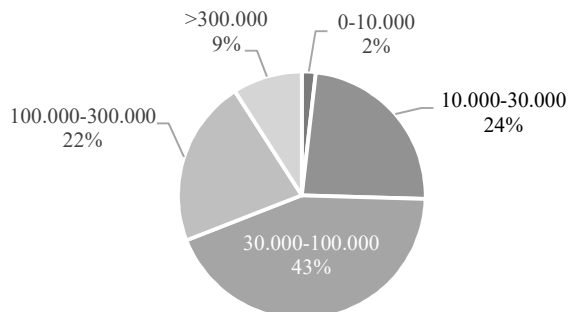


Figure 4: Shares of different company sizes in our dataset

We hypothesized that there might be a correlation between the size of a company in terms of employees and the number of CE units implemented. Therefore, we conducted a Pearson correlation analysis, which yielded a correlation coefficient of $r = 0.32$. This suggests that there is a low to moderate positive correlation between company size and the number of CE units implemented. Accordingly, some large companies have a relatively low use of CE units and, conversely, some smaller companies have a relatively high use of CE units. However, it should be emphasized that many of our 'small' companies already have significant size and thus sufficient resources to 'afford' multiple CE units. The larger companies are partly represented by non-manufacturing companies with a strong service orientation (e.g., wholesales, banks), which have many employees in service, but few associated with R&D activities.

We were also interested in how long companies have used multiple CE units in parallel. For this purpose, we analyzed the years in which they introduced their second unit (see Figure 5). It turns out that companies only started to introduce additional systematic CE support units in the 2010s. However, the majority of companies did so only between 2014 and 2018, and only a few after that. This analysis underscores the timeliness of the phenomenon we examine in this study, and offers a reason why little empirical research has addressed it to date.

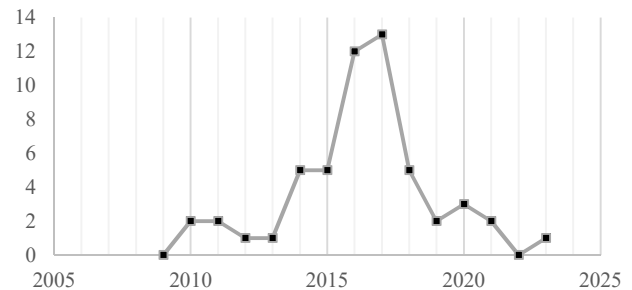


Figure 5: Cumulative number of companies in term of the years they implemented their 2nd CE unit

We also analyzed the point in time at which our companies implemented all of their CE units. Therefore, we cumulated the number of CE units (for the 273 units for which we had this information) in terms of their respective opening and closing years (see Figure 6). This analysis shows a sharp increase in the number of CE units implemented in the years between 2014 and 2018. Since 2018, the increase has been less pronounced, partly due to the simultaneous closure of a small number of CE units.

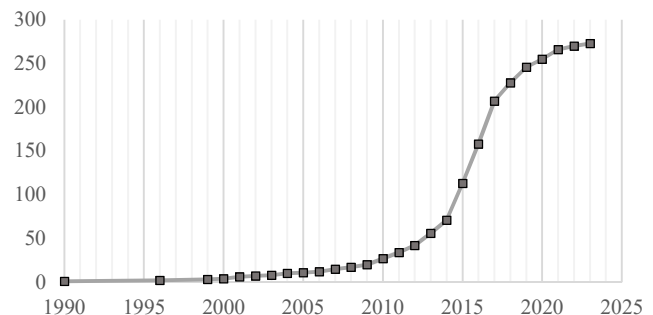


Figure 6: Net number of CE units of all considered companies regarding their opening and closing years

Furthermore, we considered the CE units and their respective forms as they are used per industry (see Table 1). It is interesting to note that most forms of CE units can be found throughout almost all industries, yet with quite different amounts of implemented units. Furthermore, certain industry-related preferences for certain forms can be identified.

Finally, we looked at single companies' use of CE units and found that they not only use different numbers of CE units, but also different combinations of CE forms. For example, there are companies whose CE units are all different forms, while other companies use only a few CE forms for a comparable number of units. In this study, we do not further examine the different combinations of CE forms. Nevertheless, we would like to provide some initial insights and therefore present two exemplary cases below.

	Assisted Incubator	Collective Matchmaker	Cooperative Explorer	Digital Factory / Tech Lab	Idea Validator	Innovation Lab	Intrapreneurial Excubator	Investing Co-Creator	Startup Facilitator	Strategic Investor	Venture Builder
Technology	6	2	11			1		1	7	2	
Telecommunications	1	2				2		3		1	
Health Care	1	2		2				3	3	6	
Financials	3	2	3	3		2		4	11	5	1
Real Estate								1	1		
Consumer Discretionary	13	17	3	4	3	10	3	19	17	19	5
Consumer Staples	3	2		1		3		2	9	1	
Industrials	8	3	1	1		2		5	12	5	3
Basic Materials	3		1				1	15	2	4	
Utilities		3	2		1			4	1	2	1

Table 1: Number of CE unit forms categorized into the relevant industries

B. Two Exemplary Cases of the Parallel Use of Multiple CE Units

The first of the two cases we present is a well-established med-tech manufacturer with a long company history, more than 65,000 employees, and two main divisions with a wide range of different products. Although the company has always been innovative, with significant R&D activities and initial investments and collaborations with startups, it started to use systematic CE support units in 2017. It simultaneously implemented two different forms of CE, one in each main division. One unit had a startup facilitator approach to establish collaborations with startups, while the other unit was designed to support the company's own employees in incubating ideas until they were ready for the market. In 2020, the company also introduced an innovation lab to explore faster ways to commercialize med-tech products while working on radically new technologies. Most recently, the company launched an investment vehicle through which specialists scour the startup landscape for strategic investment opportunities.

While the implementation of the various CE units certainly appears to be focused and competent, each unit had to go through a certain experimental learning process to arrive at its current approach. For example, the startup facilitator initially pursued product and process innovation, but learned that co-creating products required both more intensive collaboration with the startups and adequate competencies in the core organization. In the absence of these competencies and an appropriate follow-up process, the evaluated product innovation projects had to be terminated. In contrast, the initiation of joint process innovation projects worked very well, and the CE unit focused and specialized its approach accordingly. In addition, the introduction of the innovation lab demonstrated the company's courage to enter radically new areas. In the med-tech sector, time-to-market is a relatively long process, so finding new ways to significantly shorten this process could become a critical advantage for the entire company in the future.

The step-by-step introduction of additional CE units shown by this case company is very typical for most companies. By experimenting with new ways of creating innovation, the company gains competence in dealing with such units and their general potential. The experience with the existing units on the one hand leads to the creation of similar units in other locations. On the other hand, due to the specialization of a unit (e.g., in terms of main activity, innovation type, industry focus, idea maturity), other innovation potentials are not addressed, which in turn are targeted by additional units specializing in them. Companies that develop multiple CE units in parallel thus show a certain degree of co-specialization between the CE units [54, 55]. These units complement each other, share their work, and work together to achieve specific innovation goals.

The second case is a German car manufacturer with more than 36,000 employees. This company went through a similar learning process with its first CE units. Exploring new ways to create innovation did not lead to the desired innovation results, so after a period of experimentation, the company decided to relaunch. Therefore, in 2016, the company introduced a new structure (legal entity) in which the existing activities were bundled and reorganized.

This 'umbrella unit' included six different specialized CE units, with more units planned. For example, there was a unit for the idea development, several units for more focused (in terms of innovation type and core relatedness) incubation of these ideas, and a company builder for the targeted commercialization. In addition, the company had corresponding venture capital units that provided funding for external and internal ventures. These CE units were thus highly co-specialized, with a broad portfolio of innovation projects that were collaboratively orchestrated to provide the best possible support at every stage of their development.

C. Managerial & Scientific Implications

Our study highlights the increasing importance of CE units in the current innovation development of German established companies. This is also in line with various studies that have recently shown that even (or especially) in times of crisis and economic downturn, companies should continue to invest in new innovation activities [56]. This may be a justification for innovation managers to use CE units. In addition, the presentation of the combined use of CE units in companies of different industries and sizes provides managers with a reference for benchmarking their implemented CE units. This allows them to see how their use of CE units compares to their industry and company size.

The presentation of the two cases also provides managers with insights into how other companies use multiple CE units in parallel. This provides an explanation of the reasons for implementing multiple CE units in the first place, what the interfaces between the CE units look like, and how the CE units might even interact with each other.

Scientifically, this study addresses the rather unexplored field of parallel use of multiple CE units. Various scholars have called for research to analyze how CE units can be managed in combination [21, 43] in order to potentially realize synergies between them [23, 45, 46] and ultimately achieve companies' innovation goals. Thus, we contribute to this discussion by characterizing companies' combinations of CE units.

Furthermore, our analysis shows that CE forms are not always implemented in the same way and differ in their configuration. This is in line with research by scholars [20, 21] who highlight and address this issue by developing more descriptive categories along specific dimensions to clarify the differences between typical CE forms. Through our two case samples, we provide insights into how different CE forms can be used strategically in combination. We also show that companies typically go through a learning process until they have found and developed the approach of each CE unit to achieve their innovation goals.

D. Match & Contribution

By examining the topic of the parallel use of multiple CE units, this study addresses the key conference theme "R&D, Innovation, Technology, and Entrepreneurship" of the ICE Conference 2023 on the one hand and the field of interest "Innovation & Entrepreneurship" of the IEEE Technology & Engineering Management Society (TEMS) on the other.

V. CONCLUSION & FUTURE RESEARCH

A. Concluding Remarks

With this study we aimed to shed some light on the recent phenomenon of the parallel use of multiple CE units. By analyzing 165 large established companies of the German business landscape we identify 55 relevant companies. With this, we show that the use of multiple parallel CE units is not limited to single industries or to specific company sizes, but is relevant for virtually all companies, and increasingly also for the smaller ones. Further, we emphasize that the purposeful use of multiple CE units and CE forms has advantages for companies' innovation creation. For example, more and more companies show coordinated approaches with co-specialized CE forms, division of competence fields, sharing of knowledge and resources, and overarching collaboration to achieve common goals. However, this field is still widely unexplored, which is why we conducted this study to enhance the discussion and call for further research.

B. Limitations

An obvious limitation of our study and its methodology is that it is quite possible that we did not find all CE units in all 165 companies we studied. For example, internal employee-only CE units often do not have a public presence, and if there are no other public reports about them, they are difficult for external parties to identify. In addition, there may have been CE units implemented that were closed some time ago, causing information about these CE units to 'disappear' from publicly available sources. This may have resulted in an undercount of CE units for these companies, and perhaps even an exclusion if they fell below the two unit threshold of our analysis. However, it can be assumed that this error is equally distributed across all companies. To identify these missing units, one could conduct a survey asking all potentially relevant companies about their CE units.

C. Future Research

Our study of the parallel use of multiple CE units raises the question of whether patterns can be identified in terms of typical combinations of CE units. Thus, it would be interesting to investigate whether patterns can be identified with respect to the combined forms of CE units, the associated main activities (e.g., investment, collaboration, incubation, venture building), the basic orientation (internal / external), the innovation flow (inside-in, inside-out, outside-in, outside-

out), the supported idea maturity (seed, early, later) or also the pursued innovation types (product, service, process, business model) and whether these patterns differ with respect to contextual factors such as company size and industry.

As mentioned above, there are several positive effects that can result from the parallel use of multiple CE units. However, so far there is little empirical research on such synergies between multiple CE units [45, 46]. Therefore, we propose to empirically investigate which synergies can be identified between CE units and whether there are also negative externalities that may arise from certain combinations of CE units. Furthermore, researchers should investigate how CE units should be coordinated in order to purposefully create positive effects and reduce negative ones. We suggest that this may be the key to the more effective, and possibly even more efficient, discontinuous innovation creation.

In line of this, it would also be interesting to see if there is a relationship between the number of CE units implemented in a company and its performance in terms of its innovativeness. Performance can be operationalized by indicators such as sales growth in general and in new products, relative R&D budget spent, or patents filed. The question is whether this relationship is linear monotonic, non-linear monotonic, or even non-monotonic (i.e., inverse U-shape), and thus what kind of optimum should be sought. In addition, it remains to be investigated whether other factors (e.g., company size, industry) moderate this relationship.

Finally, the evolution of CE and the increasingly comprehensive and strategic use of specific CE units suggest that the use of CE units can be used to derive a certain level of maturity in dealing with CE. Therefore, it should be investigated which types of implementation show higher maturity and along which dimensions (e.g., co-specialization) this can be characterized.

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