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Harvesting Success: Exploring Performance Metrics for Corporate Entrepreneurship Units

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***Abstract*— While Corporate Entrepreneurship (CE) units have become essential tools for creating new kinds of innovation within established companies, their performance measurement remains underexplored. With CE units, companies intend to contribute to new business and organizational transformation. Thereby, CE units are used to create outputs that are new for the core organization. Until now, scholars have neglected to investigate assessing CE unit performance, leading to a lack of understanding of appropriate metrics for CE units. Companies often use traditional metrics designed for relatively static contexts, but these metrics do not fit for CE units. This study explores the metrics used in CE units, analyzing 12 interviews with 11 German companies. The analysis reveals a list of different metrics, categories, and underlying dimensions for CE unit performance measurement. Finally, we suggest scientific and managerial implications and topics for future research.**

Keywords—corporate entrepreneurship units, performance metrics, degree of implementation, interviews, Germany

I. INTRODUCTION

Corporate entrepreneurship (CE) units have become an essential tool for established companies to create new businesses and to implement structural and cultural change for their long-term viability [1–3]. More and more companies have implemented CE units to foster multiple innovation experiments, corporate ventures, and startup collaborations [4–6], each quickly exploring and leveraging promising business opportunities while bringing new resources, capabilities, and thinking to the core organization. With these CE units, companies pursue goals and specific outputs that differ from those of the core business units [7]. CE unit goals are primarily formulated in non-financial, strategic, and vague terms [8], like developing new competencies and knowledge, insourcing innovation using an innovation ecosystem, or establishing places for employee idea generation [8–10]. Additional financial goals are formulated, like new revenue from CE innovations or returns on startup investments [8]. The distinctiveness and variety of the CE unit goals are reflected in the CE unit's output [4]. Such CE unit outputs are, e.g., validated innovation concepts, sensitized senior management, new ways of working, strategic partnerships, or intelligence on trends [4, 11, 12]. Although the CE units can deliver a wide range of outputs, their achieved impact seems to fall short of corporate leadership's expectations [13]. The resulting dissatisfaction makes corporate leadership question CE units' general success, which often leads to limiting their investment in CE or even terminating them prematurely [14].

Organizational literature argues that specific managerial practices are needed to ensure that organizational behaviors, decisions, activities, and outcomes are consistent with the goals, strategies, and expectations set by leadership and to facilitate learning and change [15–17]. Since Peter Duckers "*you can't manage what you can't measure*", performance measurement is a critical practice that provides relevant input information for comparing and evaluating goal achievement with appropriate metrics and indicators that capture activities and results [18]. However, the achievement of CE unit goals often seems to be insufficiently captured by traditional metrics. Traditional metrics are used for the units of the core organization, but seem inappropriate for the CE context [2]. Thus, we assume that different types of metrics are needed in the context of CE units to decide on the success of CE units.

CE units have specific goals and various outputs that consolidated traditional indicators can hardly capture [4, 19]. Some scholars suggest that more non-financial, long-term-oriented, and qualitative metrics(rather than purely financial ones) benefit the entrepreneurial environment [19–21]. However, the CE literature has missed insights about performance measurement at the unit level. Previous research has not yet clarified which dimensions, metrics, and indicators can be used to quantify the output quality and evaluate the performance of CE units [14, 22, 23]. In this study, we follow the call for more empirical research on performance metrics for CE units [2, 14]. We aim to explore how companies metric their CE units' outputs and how to systematically structure these metrics to allow for their appropriate usage. For this purpose, we pose the following research questions:

RQ1: *What types of metrics can be distinguished for the outputs and impact of CE units?*

RQ2: *What dimensions may be identified to characterize the metrics of CE units?*

This study is scientifically relevant because the intended findings will enhance the existing knowledge on measuring CE performance at the unit level using a more nuanced characterization of suitable metrics for the CE units and possible presentation of the difference to metrics of other contexts in established companies. Moreover, the characterization might help to make CE unit goals and outcomes operationalizable and thus quantifiable. From a managerial perspective, knowing appropriate metrics for quantifying the output of CE units and how they differ from traditional metrics (for core business units) allows CE unit

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leaders and their corporate leadership to set up performance measurements specifically for CE units. Furthermore, using CE unit-specific metrics allows for tracking the achievement of CE unit goals more reliably, provides corporate leadership a basis for making decisions about the status of the CE units, and may reduce dissatisfaction with the CE unit's success.

II. Theoretical Background & Work

A. Performance Measurement, Requirements & Context

Performance measurement has evolved with global trends and discussions in different industrial and corporate contexts since its early beginnings (19th century) [24]. Those trajectories turned performance measurement into a multidisciplinary field extensively studied from multiple perspectives (e.g., strategic control, information systems, operations, and accounting) [25]. The generalizability and adaption of insights are contingent on the specific context, meaning that insights need to be adapted to the context of analysis. How performance measurement manifests for the contexts of uncertainty and new types of innovation is not yet clearly described [24], thus representing a knowledge gap in the current research on performance measurement.

Literature on organizational performance measurement assumes that some form of measuring what matters is required to provide the necessary information that helps to guide an organization or organizational unit to achieve its goals, validate its strategy [26], and take the right strategic direction ahead [27]. Performance measurement refers to the "process of quantifying the effectiveness and efficiency of actions with a set of metrics" [18] and involves defining the respective dimensions, metrics, and key indicators [28]. The type (what to measure) and mode (how to measure) of metrics provide the practice to track how effectively or efficiently actions and resources are being used to achieve the goals [15].

According to certain studies, some hygiene conditions must be fulfilled for metrics to assess the degree of goal achievement [28, 29]. This includes the systematic derivation of metrics from the initial purpose of the organization or organizational unit [30], alignment with the goals and potential output [19] and distinction between lead and lag metrics [29] for the respective goals, and formulation in a way to communicate and operationalize strategic priorities [27, 31]. Further, the reason for measuring should be specified [32], i.e., is it only about checking, or is it also about verifying and learning what works and what does not [16]? Additionally, using different types of metrics is considered beneficial [29, 33]. Traditional accounting-based financial metrics like profitability and return on asset or investment are widely used by organizations to measure performance objectively. However, they are past-oriented and provide little insight into future direction or strategic performance [34]. Thus, it is advised to have a set of non-financial metrics that capture the strategic impact and interests of the various stakeholders [35]. However, there are contrary opinions on the extent to which companies should be focusing on non-financial issues [24]. Since some scholars acknowledge the contextuality of control, it seems helpful to consider context specificity to resolve this ambiguity [36].

Exploiting and adapting to the current environment can lead to positive short-term performance, which is effectively captured using financial metrics [37]. For assessing exploration and adapting to changing environments, scholars suggest specific metrics that are based on non-financial, future-oriented, and qualitative aspects [20, 21]. Although different metrics are postulated, the indications of their types and operationalization for the context of uncertainty and dynamics remain inadequately delineated.

B. Performance Measurement in the Context of CE

In the context of CE, previous research has focused primarily on examining the overall impact of CE on the financial firm performance of the organization with mostly traditional metrics like return on investment, cash flow, or market share [2]. At the level of single corporate ventures, the literature describes a variety of criteria for evaluating and selecting ventures like the progress in learning and value proposition [38], return on investment across time [39], or novelty, strategic fit, potential value, and time to implementation [40]. On the level of the CE unit that comprises multiple entrepreneurial ventures, however, only limited literature focuses on performance measurement. There are, conceptual proposals for alternative metrics (e.g., number of ideas suggested, number of ideas implemented, or subjective metrics) [41] but explaining what they actually measure and empirical evidence to indicate how they relate to goal fulfillment in the long-term, is needed.

Even though performance measurement is considered necessary for CE units, some scholars criticize the scarcity of empirical insights in the CE literature [2, 42, 43] and the scarcity of theories that cover not only the dimensions of financial performance effects [19]. They argue that instead of relying on financial metrics and aggregate indicators (e.g., ROI), which neglect the variety of motivations and potential output of CE units [4], multiple CE performance indicators are needed that allow the measurement of the full range of value creation of CE [19, 44]. Furthermore, some researchers stress that previous research fails to investigate the alignment between both what is supposed to be measured and what can or will actually be measured, meaning between the goals of the CE activities and the respective metrics providing the information for assessing the goal achievement [19, 32].

C. Likelihood of Different Metrics for CE Units

Given the alignment argument, a closer look at the CE unit's goals, outputs, and time horizon may help to explain limited insights into the performance metrics of CE units and what CE unit metrics might entail. CE units are assigned with a wide range of goals and outputs that differ from those of core business units [7]. Tracking these outputs and evaluating the achievement of goals seems challenging to traditional performance measurement because, i.e., new and more sophisticated metrics are required [45]. Most CE unit outputs are non-financial, or their financial value only becomes visible and reliably measurable after a more extended period (typically 5-10 years), like revenue from new business models or startup investments [4]. The same applies to CE unit goals, which are often less financial and more strategic and long-term in terms of a mission [8]. Therefore, we assume a focus on non-financial and strategic aspects of CE unit metrics [30].

Additionally, the variety of different outputs of CE units is difficult to measure objectively, neither through standard performance metrics like productivity, sales growth, or work efficiency, nor through individual qualitative CE-specific metrics like the number of ideas supported, or people trained in entrepreneurial methods [4, 19]. Therefore, we also assume a range of different metrics for CE units that quantify those outputs.

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The long-term focus of CE units may lead to situations where certain goals overlap with those of the core organization, such as revenue generation. These joint goals, however, may require adjusted measurement approaches – the same variable but different operationalization. This is because while the goals may be similar, the timing of achieving the goal and hence the type of output, are different. Therefore, we assume that CE unit metrics track intermediate outputs and that there are multiple metrics to assess the same goal at different points in time.

As the literature review shows, the question of measuring CE unit performance has not been adequately addressed. Therefore, this study aims to contribute to this.

III. Method

To explore the metrics used by established companies to assess CE unit performance, we followed a qualitative research design [46]. Therefore, we conducted a multiple case study where we interviewed different managers supervising certain CE units, asking them how they measure their CE units' performance [47].

A. Data Collection & Data Sample

We aimed to sample a diverse yet relevant pool of respondents. We targeted technology companies in Germany with substantial corporate histories, all of which had operated CE units for over five years. Interviews were conducted with individuals in various management positions within these companies to ensure a comprehensive understanding of different roles and perspectives, such as the heads of the CE unit, operation managers within the CE unit, or managers responsible for long-term projects within the CE unit. A total of 12 semi-structured interviews were conducted between 2020 and 2024, covering insights from 11 case companies (see Table I). These cases can be assigned to one of four overarching groups we used to describe the different forms of CE units [4]. As some cases cover different forms within an umbrella unit, more than one group is mentioned for this case.

The interviews addressed key aspects of CE units and their performance measurement. Respondents were asked about (a) the motivations and reasons for implementing CE units, (b) the activities undertaken by these units and their integration within the organizational structure, and (c) the control practices, including goal setting, performance measurement, and evaluation. Each interview lasted approximately 60 minutes on average. All interviews were audio-recorded to ensure accuracy and completeness of data, then transcribed and qualitatively analyzed.

B. Data Analysis

Our data analysis followed the Gioia method, which offers a systematic approach to rigorously examine qualitative data [48]. Accordingly, we conducted a three-step aggregation of the raw interview data into (1) respondent-centered codes, (2) theory-related themes, and further into (3) abstract dimensions. First, the interview data was open coded using NVIVO 12 software. This entailed a line-by-line examination of the interviews to identify potential CE unit metrics and the coding of representative quotes into 1st-order concepts, which constituted the different CE unit metrics. As part of this first step, various characteristics were identified, some of which serve to better describe the metrics and others to differentiate them from each other, facilitating a deeper understanding of the metrics' variation. To generate the 2nd-order themes and aggregated dimensions we followed an iterative process. In the second step, the metrics were systematically grouped into different categories of metrics (2nd-order themes) based on their common characteristics. For a consistent grouping, the metric categories were compared against the individual concepts and across the themes at the same level [49]. Additionally, the identified categories were reconciled with those suggested by literature where feasible. Similarly, in the final step, various underlying dimensions were identified and analyzed to reveal broader patterns and theoretical insight.

IV. Findings

A. Identified Types & Categories of Metrics for CE Units

Our analysis revealed 32 distinct metrics companies use to measure the performance of their CE units (see Table II). A closer consideration of these metrics revealed that they can be grouped into ten categories. These categories are based on the content-wise differentiation of CE unit outputs and impact to be measured by metrics.

TABLE I. Overview Data Set

Respondant	Industry	Employees	CE Unit Type
1	Technology & service producing	427.800	Internal Incubation
2			Startup Engagement
3	Automotive parts producing	200.000	Startup Engagement
4	Automotive parts producing	169.000	Internal Incubation
5	Software producing	108.000	Startup Engagement
6	Chemistry & pharma producing	100.000	Internal Incubation
7	Automotive parts producing	83.000	Startup Engagement
8	Automotive parts producing	72.000	Startup Investment
9	Medical technologies producing	63.000	Company Building
10	Automotive vehicle producing	42.000	Company Building
11	Motorized device producing	21.000	Startup Investment
12	Automotive consulting	14.000	Company Building

a) Awareness

The awareness category focuses on the *"internal and external visibility"* the CE unit could generate for itself, its activities, and related topics like CE/intrapreneurship, open innovation, and transformation inside and/or outside the organization. Internal stakeholders are, e.g., employees and top management; the external ecosystem is, e.g., startups or investors. For this, the companies first count the performed awareness-rising activities, like postings and newsletters sent out or the *"number of specific events attended"*. Second, they monitor the resulting impact of their awareness-rising activities in terms of reach *("how many [people] actually have an awareness for our activities and know them")* and reactions to the communication (e.g., website visits, LinkedIn clicks/likes/reposts) or new contacts.

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TABLE II. OVERVIEW OF CE UNITE METRICS

a) Awareness – Number per type of internal/external communication activities (e.g., # of intranet, LinkedIn or press articles) – Number per type of internal/external networking activities (e.g., # of events attended) – Number of promotors (employees/external actors) of the CE unit – Number of people who know the CE unit and its services
b) Demand – Number of people and projects gone through the CE unit – Number of initial requests for the CE unit's respective services from core business units/external parties (e.g., startups) – Requests for continuing services of the CE unit from core business units/external parties
c) Strategic Fit – Ideas and startups identified for strategically important search fields – Achievement of corporate-startup business relatedness
d) Program Capacity – Number of identified potential innovation fields – Number of scouted problems, ideas or startups – Number of startups presented for evaluation – Number of investments and partnership agreements – Number of supported ideas and startups
e) Entrepreneurial Education – Establishment of entrepreneurial mindset after participating in the CE unit – Active application of entrepreneurial methods learned in the CE unit
f) Acceleration – Time saved in innovation development until a specific maturity of the ideas – Time saved in coming to terms with external partners (e.g., startups)
g) Portfolio Success – Business value of the idea and startup portfolio – Number of paying customers (core business units/end customers) – Number of visitors on the sales channels of the new business offerings – Number of projects at specific maturity gates (validated idea, PoC, MVP) – Number of followup investments into specific ideas and startups – Number of new jobs created with ideas and startups – Number of projects stopped that were not expected to succeed
h) Expense – Investment volume in the ideas and startup portfolio – Costs of the CE unit
i) Satisfaction – Net promotor score for the CE unit services – Net promoter score for the new business offerings
j) Financial Return – Revenue/EBIT (potential) from new offerings of ideas and startups – Saved cost (potential) from the implementation of new offerings – Payback time of startup investments and/or total expenses of the CE unit

b) Demand

This category focuses on the request for and use of the CE unit's topics and services by the respective target group (e.g., employees, startups). For this, the companies count the requests from core business units or startups for the CE unit's services, which helps them understand if the services offered are of interest to them. Further counting of "*how many people have participated in our services*" like "*workshops, training, or idea development program*" indicates the occupation of the CE unit and the potential impact that the participants sense with the learning gained in the CE unit.

c) Strategic Fit

The strategic fit category focuses on the alignment of the CE unit's services and outputs with the corporate strategy and goals. For this, the CE units want to ensure that the selected and supported ideas and startups show fit with specific strategic requirements (*"business models with a revenue potential of a certain amount"* or *"within the sustainability area"*). One common requirement, for example, is the business relatedness of new solutions (improving or complementing core business) in the sense of *"neither too far nor too close to the core business"*, which is operationalized, e.g., with *"whether and if so, how many of the ideas/projects are relevant to our existing customers".* This allows them to understand to what extent the CE units contribute to the company's strategy implementation.

d) Program Capacity

With the program capacity, the CE unit's implementation potential and services are measured. For this, the companies count the number of ideas and teams supported by the CE unit along the respective phases of the innovation funnel *("number of startups analyzed potentially eligible for partnering"* or *"we use number of proof of concepts as an activity metric"*). The capacity helps to understand the innovation potential, how much of it is exploited through the CE unit, and, therefore, how high the CE unit's productivity is.

e) Entrepreneurial Education

This category metrics whether CE unit participants have learned to think and act entrepreneurially (e.g., customer-centric thinking, agile working, prototyping). For this, the companies measure, e.g., with *"regular employee survey or informal feedback",* the effectiveness of training (i.e., *"how helpful and transformative participants found the program"*) and the actual transformed behavior and use of methods ("*ask to what extent innovation is prioritized higher or incremental innovation projects progress faster*"). Apart from the training effectiveness during the CE unit's program, this allows them to assess whether the entrepreneurially trained employees are likely to support the creation of new innovations in other positions in the organization afterward.

f) Acceleration

This category focuses on the acceleration of innovation development (e.g., *"savings in developing MVPs"*) resulting from using the CE unit's way of doing things. For this, the companies in our data measure the time required by the CE unit to deliver certain outputs (e.g., to process a partnership with *"time we need from first contact with the startup to signing the contract"*) and compare this to the time it would have taken for the core business with established processes to do it. Measuring time-saving shows if the CE unit can deliver (similar or even "more innovative") results more efficiently by using alternative approaches, which could become a new standard for the organization.

g) Portfolio Success

Portfolio success refers to the achievement of desired outcomes for the various teams and ideas accelerated by the respective CE unit. This involves counting the projects that have reached the maturity level specified as the desired output by the program (e.g., successful market launch with *"paying customers"*). Additionally, CE units often count the *"projects that had to be terminated"*. This helps to understand to what extent the desired outcomes (e.g., new business) are about to be achieved and that the right activities are carried out.

h) Expenses

This category addresses the total cost of the CE unit and its supported teams/ideas. For this, the companies in our data measure *"how much we have invested in total into startups"*

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in terms of financial budget and personal capacity to see what was needed and will be needed in the future to develop the ideas and startups along the innovation phases. Further, they are *"looking at [their] costs"* for operating the CE unit measured (e.g., staff, marketing, and sometimes also an investment fund) to understand the size of the available budget and what they can get out of it minus their costs.

i) Satisfaction

The satisfaction category focuses on the evaluation of how satisfied the CE unit's (internal/external) customers are with its services as well as with the resulting new business offerings created through its support. For this, the companies measure the perceived helpfulness of the CE unit services for the participating teams and their ideas or the end customer's satisfaction with the new offerings. They use quantified feedback from the different customer groups (e.g., "*net promotor scores for the first phase of our collaboration with the startups*"). This allows an understanding of the extent to which the CE unit meets expectations and creates value.

j) Financial Return

The category of financial return focuses on the financial impact created by the startups and ideas supported by the CE unit. This involves quantifying the financial profit in terms of "*revenue or EBIT of the startup teams*" realized from exploiting existing and new offerings or reduced expenses *("saved time with the startup partnering proof of concept"*) through improvements in the core organization.

B. Identified Attributes of Metrics for CE Units

Examining the performance metrics across the different CE units in our data resulted in insights into the level and format of measurement. We briefly outline how these metric attributes manifest for CE units in established companies.

Regarding the format of measurement, the majority of identified metrics are non-financial. The financial metrics are found only within the categories of financial return (e.g., revenue) and expenses (e.g., costs of the CE unit). Additionally, most of the metrics are quantitative, and only a select few are purely qualitative (4 out of the 32). These qualitative ones relate to the metrics of entrepreneurial education (e.g., establishment of an entrepreneurial mindset) and strategic fit (e.g., ideas in strategically important fields).

Regarding the level of measurement, the majority of the metrics are defined at the unit level to capture the unit-related activities and outputs, like metrics for awareness and demand. However, one-third of the metrics used for measuring CE unit performance on our list are venture-level metrics to measure individual venture performance, like metrics in the categories of portfolio success and financial return categories. Some categories of metrics manifest at both levels like satisfaction.

C. Identified Dimensions of CE Unit Metrics

We have considered multiple dimensions to sort our identified performance metrics. After thorough consultation within the author team and discussion with experts in the entrepreneurial field, we decided to choose dimensions that relate to a key aspect of goal achievement of CE units: the measured outputs represent results that align with the CE unit's mission yet represent intermediate outputs needed to obtain the CE goals of the company later on. As a result, the aggregated analysis revealed three underlying dimensions to further summarize our identified metrics (see Table III).

TABLE III: CATEGORIES AND DEMANDS OF CE UNIT

Metric Categories	Dimensions
Sensitization & Scouting - Awareness - Demand - Strategic Fit	**Tilling**
CE Activities - Capacity - Portfolio Success - Expense - Satisfaction	**Farming**
Impact - Entrepreneurial Education - Acceleration - Financial Return	**Harvesting**

(1) Tilling: The first dimension describes, metaphorically speaking, all metrics that aim to ensure the "*tilling of the innovation fields*" the company plans to address with its CE units. In other words: tilling refers to the positioning of the CE unit in line with the company (strategic fit) and it refers to the awareness and demand from within and outside the company regarding the CE unit (awareness, demand). Therefore, the company metrics the scouting of relevant strategic fields to innovate as well as ideas and startups ("seeds") that could potentially be "planted" in the respective fields. To raise awareness and attractiveness, companies further measure the CE unit's sensitization efforts and their effect.

(2) Farming: The next dimension comprises all metrics that track the "*farming*" or execution of the central CE unit activities (i.e., incubation, collaboration, company building, investing). Accordingly, they help to assess how many seeds (ideas and startups) have been planted and how much effort is needed to develop and grow these seeds to reach the desired level of maturity.

(3) Harvesting: The final dimension is to measure the "*harvest*" of all CE unit efforts. In other words, it is about measuring the financial and strategic impact of the CE unit achieved through all activities directly or indirectly related to supporting ideas and startups.

Overall, the three dimensions of tilling, farming, and harvesting build up on each other. First, the measurement records the extent to which stakeholders have been sensitized and an adequate number of potential ideas or start-ups have been identified, which then feed into the respective CE activities. Subsequently, the progress and outputs of the CE activities are measured as the ideas are actually developed to a certain level of maturity. In this context, these dimensions represent concretization levels from initial ideas to derived contributions for the core organization.

Considering the number of metrics per dimension shows that the majority of metrics are to control the activities of the CE unit. Interestingly, the least number of metrics is found in the harvesting dimension, even though companies are usually very interested in the impact of CE units.

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V. Discussion

Our article focuses on performance metrics that can be applied by companies with Corporate Entrepreneurship units (CE units). CE units are organizational entities that support radical innovations, new business models, and entrepreneurial behavior necessary for established companies to survive in turbulent and changing market contexts. An electric car is an example of a radical innovation for an automotive company that traditionally focused on combustion engines. The innovation is radical because it requires competences that the company has not have yet. The new business models refer to digital marketing, updating software of cars while in use, and selling data gathered during the use of the car, all of which entail a new type of organization that such an automotive company may not have mastered yet. To develop, implement, and adapt such radical innovations, employees may have to adopt more entrepreneurial behavior and the organizational structure of such units may have to be adapted compared to the existing, more traditional business units. So, CE units are established by companies because the existing business units in the core organization lack the competences to develop and foster radical innovation and new business models.

CE units are directed to obtain long-term company goals, yet they do so in a different way than existing business units. It may come as no surprise that the CE units are providing other types of output for the company. Hence the performance metrics that can be adopted to assess the output of a CE unit will diverge too. Our article investigated the performance metrics that companies use for their CE units. In doing so, we interviewed CE unit leaders from 11 companies.

A. Research Question 1: Interpretation of Metrics & Categories

Our first research question is “What types of metrics for CE unit outputs and impact can be distinguished?”. Our empirical findings include 32 different metrics, which were sorted into ten categories of metrics. These ten categories were 'awareness', 'demand', and 'satisfaction' from within and outside the company regarding the CE activities; ‘strategic fit’ of the CE unit activities with the company mission; ‘program capacity’, meaning how many activities can be hosted and facilitated in the CE unit; ‘entrepreneurial education’ referring to the training of employees in how to act entrepreneurial; ‘acceleration’ meaning that activities regarding innovation development are completed faster than normally in the company; and ‘portfolio success’ indicating various numbers of intermediate results. Finally, two financial categories of metrics are found: ‘expenses’ indicates the costs and investments in the CE activities while ‘financial return’ refers to the financial outputs for example in income or costs saved.

A scientific contribution of this finding is that we empirically show that companies use different performance metrics for their CE units than the traditional performance metrics used for other business units such as profit, sales, and market share. Our results reveal interesting insights based on our assumptions derived from the current state of knowledge on CE metrics. This empirical study of CE unit metrics shows that established companies measure their CE units with non-financial ones. Surprisingly, they are quite quantitative. This suggests that financial metrics cannot be established at the outset, leading to using numerous quantitative metrics to capture outputs as objectively as possible. It is also confirmed that companies use a variety of different metrics to capture the variety of outputs and value added by CE units.

Another scientific contribution is that these performance metrics diverge from well-known metrics used to assess the performance of individual entrepreneurial ideas or startups. For companies, measuring only the progress of individual ideas and startups seems insufficient. Rather, it is important to also record the outputs and impacts of the supporting activities of the CE unit itself for these projects. This is because those supporting activities create their value, for which specific metrics are needed as evidence to justify the expenditure on supporting activities. This adds to previous studies on the performance measurement of CE, which have neglected the specific focus on the unit level.

Important discussion points revolve around the completeness and generalizability of the metrics and their categories to assess CE unit performance. For us, there are two reasons to assume that our list is a fairly complete one. First, the selection of a heterogeneous sample of cases in our empirical work is important for a comprehensive result. By including companies from different industries and with different forms of CE, we are quite confident that the list of metrics already includes many of the most relevant ones, though not exhaustively. Additional cases with even different CE units would likely reveal additional aspects. Second, comparing our empirical data with the theoretical data shows that the metrics we identified in the literature for CE activities [41, 42] are almost entirely reflected in our comprehensive list, e.g., number of identified ideas or signed partnerships (program capacity), EBIT contribution (financial return), and financial investment (expenses). Particular metrics at the venture level have been specified in our list to illustrate how they can be used at the unit level, such as strategic fit, novelty, and progress in value proposition (portfolio success). Moreover, our empirical investigation has yielded a series of additional metrics. Regarding the point of generalizability, the description of the metrics in the list is abstracted to a level where the individual metrics apply to different forms of CE units, thus addressing the heterogeneity of CE units. At the same time, we have tried to describe them in a way that clarifies their operationalization and subject of measurement. We, therefore, believe that we have empirically created a list of metrics that can be used across a range of CE units and thus are generalizable. Overall, with this list of metrics, we expand the previous view of performance metrics for CE.

B. Research Question 2: Interpretation of the Dimensions of Metrics

Our second research question is “What dimensions may be identified to characterize the metrics of CE units?” Many different dimensions could be derived. We opted for dimensions that reflect a unique characteristic of CE unit performance: the fact that the outputs mostly refer to intermediate results that in the long term contribute to the company goals. Our findings indicate that for CE units, the process of tilling, farming, and harvesting a field can be used as dimensions. Tilling involves preparing the subsequent activities of the CE units; farming the various support activities of the CE units for the ideas and startups; and harvesting the different impacts that result from these activities.

A scientific contribution of creating these dimensions is that they reflect the mostly emerging and immature nature of CE unit output. These dimensions can be considered degrees of implementation (DOI), a concept from project and program control [50, 51]. The DOI is defined as the "extent of change

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that has occurred at a given time towards full effect" [50] and is seen as critical for evaluating program outcomes and examining innovation processes [50, 51]. In CE literature, however, DOIs are not yet used. The DOI concept helps to assess an organization's performance against project and program maturity levels [52]. Each DOI has a set of intended outputs for the project or program progress, and the respective metrics help to understand how far existing outputs are from the intended ones and have thus led to the fulfillment of the DOI. We see that the DOIs build up on each other (Figure 1).



Fig. 1. Degrees of Implementation for CE Units

In the context of CE units, the DOIs can be interpreted as follows: to effectively engage in the different farming activities, CE units require different 'tilling' efforts, which thus act as sufficient conditions for success. For example, ensuring that the ideas have a strategic fit so that the next step does not involve intensive work and investment in ideas that may not really fit the business and may not be implemented. Once the farming has been done, e.g., ideas have matured to a certain level of MVP or paying customers, then the 'harvest' of significant impact may be more likely to be achieved and measured in the next phase.

Another scientific contribution of these dimensions is that they indicate that CE units create outputs that contribute to company goals in different timeframes. The perspective of DOIs and their measurement contributes to a better understanding of what can be achieved in each phase of CE units and how their current performance can be evaluated. Output measured as 'tilling' will only indirectly and in the long-term after a further process of maturing ('farming') contribute to company goals whereas output measured as 'harvest' is a more direct contribution to company goals. The nature of the CE units is reflected in a relatively high number of 'tilling' and 'farming' metrics and a relatively low number of 'harvesting' metrics. This empirically emerged subdivision along the DOIs strengthens the assumption that measuring CE unit performance requires a set of intermediate metrics, tracking outputs through the innovation life cycle, unlike a fixed summed index for the overarching intended impact [19].

C. *Relation between Performance Measurement, Goal Achievement & Satisfaction*

We introduced our study by noting that one explanation for the challenge of successfully implementing CE units may be found in performance measurement and its alignment with the goals of CE units. Therefore, we will illustrate the extent to which performance metrics may be used to reflect the achievement of goals and thus, when applied properly, may contribute to greater satisfaction with CE units.

Considering the assignment of the metrics along the DOI significant differences can be observed. Interestingly, most of our metrics can be categorized as 'tilling' and 'farming' and comparatively few to 'harvesting'. On the one hand, this may suggest that measuring the impact of CE units on the overall goals poses a challenge for companies. This is reasonable given the emerging and immature nature of CE, often involving long-term timeframes [53]. On the other hand, some scholars describe a wide range of possible goals [8, 9] and value added of CE units [4, 54]. Exemplary categories are new capabilities and roles for innovation, intelligence on trends, new ways of working, or employer branding. It is therefore worth taking a look at possible reasons that may account for this discrepancy: first, it may be not entirely clear to companies what outputs can be achieved with the CE units, as extant research indicates that typically multiple outputs are created with one CE unit [4]. Second, the impact of CE unit outputs is mostly transformational and less financial [4, 19], which makes them difficult to measure.

Our findings provide a first indication of how CE unit outputs contribute to the achievement of transformational goals with metrics of entrepreneurial education and acceleration. Since the transformation contributions of CE units are typically subject to spillover effects, i.e., changes in structures and processes in the core organization, this may imply the following for their measurement: involving various parties and departments of the core organization and even more new metrics for the range of value added. We can, therefore, think of more metrics such as achieving top management sensitization for startup investments or new standard processes to collaborate with startups in projects independently of the CE unit.

An important discussion point is whether our identified metrics and dimensions could prevent the dissatisfaction of the company's top management with the unit's performance, a dissatisfaction that is currently felt and is visible in the early discontinuation of CE activities by companies [14]. Measuring the output of the CE unit in terms of its contribution to transformation goals could help justify expenditures in addition to the financial return achieved, or when the financial return is realized much later. Our dimensions, with the categories of metrics, together with realistic estimates of timeframes in which outputs can be obtained and of different types of impacts reflect a more realistic perspective on CE performance that will possibly prevent dissatisfaction.

D. *Managerial Implications*

This study has shown that performance metrics of CE units are a complex phenomenon with different aspects to consider. Therefore, we present a set of valuable insights for those responsible for managing CE units.

First, the overview of metrics for the outputs and efforts of CE units allows managers to recognize the different types of metrics and which outputs and impacts can be measured with them. Highlighting the different levels of measurement for CE, managers can get a better picture of possible suitable metrics to show the progress and value creation of their activities not only regarding their ventures but also the unit itself. Based on that, they can derive possible metrics usable for controlling their own CE units.

Third, depending on the phase of implementation the CE unit is in, different types of metrics can be required to measure different effects. While metrics to demonstrate generated awareness, demand, and strategic fit represent a basis, they should be complemented with metrics demonstrating the actual implementation of projects and receiving significant desired impact. By presenting the degree of implementation as a way to systemize the variety of CE unit metrics independent of the different CE unit forms along the innovation lifecycle, we created a tool to guide managers in continuously

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measuring the value contribution of the CE unit (and not just of their ventures) and deriving potential for improvement.

E. Match & Contribution to ICE

The subject of investigation, performance metrics of CE units, fits the IEEE ICE 2024 conference call for papers on the special issue of 'Corporate Entrepreneurship, Startup Collaborations & Intrapreneurship'. Our empirically derived overview of CE unit metrics and respective dimensions enhances the extant state of knowledge on performance measurement in the context of CE and, thus, fits directly into the IEEE scope of entrepreneurial innovation research.

VI. Conclusion

A. Concluding Remarks

This study took an exploratory approach to investigate what metrics established companies use to measure the performance of their CE units. We present a novel list of metrics for CE units and their aggregation into ten categories that demonstrate the range of measurements that can be made with them. Further, we characterized these metrics with different attributes and three underlying dimensions to highlight their difference from traditional performance metrics. We contribute to the CE literature by providing empirical insights into performance metrics for CE units, and to the performance measurement literature by deepening the understanding of metric types and their operationalization for a dynamic context. We show that various metrics, distinct from traditional metrics, are needed for CE units and that measuring CE unit outputs with these metrics occurs at different timeframes. Our contribution is relevant for practitioners managing a CE unit or deciding on its survival.

B. Limitations

Despite careful planning and execution, our examination was not without its limitations. First, the number of selected cases and conducted interviews for this research was limited. While efforts were made to ensure a diverse representation, a larger sample size could have broadened the scope. Expanding the number of cases and interviews could reveal even more metrics, provide a more robust basis to validate the identified metrics, and enhance the generalizability of the findings.

Second, the study primarily relied on interviews with the CE unit leader, leading to a potentially one-sided perspective. Incorporating perspectives from other organizational stakeholders could offer additional insights into the respective approaches to CE unit metrics.

Third, certain contextual factors were not fully considered in this research. Factors such as industry, company size, and company type can significantly influence the implementation and outcomes of CE units. Additionally, while the study aimed for a heterogeneous sample regarding the form of CE units, it did not consider their influence (e.g., differences and similarities) on performance measuring. Future studies should, therefore, aim to incorporate a more comprehensive analysis of these contextual variables to provide a nuanced understanding of their impact.

C. Future Research

Building upon the insights gained from this study, we suggest several avenues for future research that could deepen our understanding of CE unit control and its implications for organizational performance and innovation creation.

First, future research should explore the process of determining and communicating metrics within CE units. Understanding how these metrics are selected, communicated, and implemented can provide valuable insights into the effectiveness of control mechanisms in fostering entrepreneurial behavior and achieving strategic goals.

Second, further investigation is needed to determine the alignment between goals and metrics for CE units. Research in this area could examine the extent to which the selected metrics accurately reflect the organization's strategic goals and if they effectively contribute to achieving these goals.

Third, the relevance of metrics for the assessment of and satisfaction with CE units merits closer examination. Future studies should investigate the role of these metrics in performance evaluation processes and their impact on the satisfaction of stakeholders involved in CE initiatives.

Fourth, the difference in metrics across various forms of CE activities emerged as a potential area for investigation. As the different CE units support different stages of the innovation life cycle, they may need different metrics. Determining suitable metrics for each CE unit at specific stages would offer valuable insights for robust evaluation.

Finally, exploring overarching archetypes or logics of control prevalent in CE units is also a promising area for future research. Understanding these broader control frameworks can provide insights into the general management and governance of CE initiatives within organizations and their specific impact on innovation outcomes. With that, we would like to encourage more scholars to study the field of CE unit control to increase its general understanding and improve the strategic management of CE units toward more effective, efficient, and thus more satisfying innovation creation.

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