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Designing impact due diligence for startups

Christin Eckerle *, Orestis Terzidis

Karlsruhe Institute of Technology, Fritz-Erler-Str. 1-3, 76133 Karlsruhe, Germany

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ABSTRACT

This paper explores the challenges impact investors face in assessing the social and environmental impact of startups, as traditional venture investing tools cannot fully capture their unique characteristics. Following a design science approach, we identify three startup-specific design requirements in the literature and propose five design principles. Building on this, we present a conceptual impact due diligence that takes into account the specific criteria for evaluating impact-driven startups. We conduct alpha tests with expert interviews that confirm the overall practical relevance and applicability of the framework. The study makes a theoretical and practical contribution to research in sustainable entrepreneurship and sustainability accounting by identifying solutions to the specific challenges of valuing such startups. Practitioners can use the resulting conceptual artifact to adapt their impact evaluation practices.

1. Introduction

Society faces global issues, such as pandemics, the climate crisis, or rapid population growth. Innovation will likely be crucial in addressing these problems (Leach et al., 2012; Long et al., 2020).

Innovation is commonly understood as a force that leads to new products or services and thus can impact socio-economic systems. Particularly when dealing with global issues, companies should ensure that the impact of innovation is positive. Startups represent a driving force for innovation since they have the ambition and dynamics to promote progress; they can likewise establish more social and sustainable practices (Bergset, 2018). For that reason, the interest in sustainable entrepreneurs and startups that follow financial and social or environmental impact has increased in recent years (Bocken, 2015).

Investors play a central role in supporting such startups. They assist them in growing faster, creating more jobs, and generating additional value (Keuschnigg, 2004). However, in contrast to traditional startups, impact-driven startups are viewed as riskier (Arena et al., 2018). They are often active in sectors with a heightened probability of failure and cannot offset these risks with proportionally higher expected returns (Nicholls et al., 2015). Hence, alongside financial prospects, entrepreneurs are urged to convey their social value qualitatively and quantitatively (Arena et al., 2018; Bocken, 2015; Glänzel & Scheuerle, 2016; Holtslag et al., 2021; Lall, 2019). Interestingly, research suggests that impact investors focusing on startups mostly use the same tools as commercial venture capitalists to perform due diligence on their future portfolio companies and merely differ in using some additional criteria (Scholda et al., 2021). However, these traditional tools of venture investing cannot capture the particular characteristics of impact startups and must, therefore, be adapted (Bengo et al., 2021; So & Staskevicius, 2015). Consequently, impact investors need more knowledge, tools, and experiences to screen the startups' societal and environmental qualities (Eckerle et al., 2022).

In this research, we will examine how impact investors evaluate sustainable startups. Further, we design a framework that helps to evaluate and monitor a startup's potential impact transparently, following the design science approach.

Hence, the constituted research question is: How to design a framework for impact due diligence practices for startups?

To achieve this, we match the characteristics of startups and the selection criteria of investors, with an emphasis on social and environmental elements.

This research contributes to several theoretical and practical research streams. We contribute to the research domains of sustainable entrepreneurship and sustainability accounting and assessment by elaborating on evaluation challenges specific to startups and presenting solutions for dealing with such challenges. Further, we contribute to the intersection of design science in entrepreneurship research, which is still

* Corresponding author.
E-mail addresses: christin.eckerle@kit.edu (C. Eckerle), orestis.terzidis@kit.edu (O. Terzidis).

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an evolving field. In addition, practitioners will benefit from the resulting artifact to re-adjust their impact evaluation practice.

We structure the paper as follows: Section 2 briefly overviews the theoretical background. Section 3 outlines the Design Science Approach for this research. In Section 4, we present the results of a systematic literature search focusing on evaluation practices, startups, and the operationalization of the evaluation practices. Based on the state-of-the-art, we first synthesize an initial version of the framework. Section 5 compiles the requirements of an impact due diligence tailored to start-ups. Further, we formulate five design principles (DPs) and propose a refined version of the impact due diligence framework for startups (Section 6). Section 7 presents and discusses the findings of our alpha testing of the framework. The paper concludes in Section 8 after discussing limitations and an outline for future research.

2. Theoretical background: awareness of problem

The scientific literature does not define impact evaluation universally (Vanclay et al., 2015; Trautwein, 2021). In her recent literature review, Trautwein (2021) finds that scholars still discuss the relationship between impact and sustainability assessment.

We build on Vanclay's (2003) highly cited definition in which he states that "social Impact Assessment includes the processes of analyzing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions. Its primary purpose is to create a more sustainable and equitable biophysical and human environment." (p. 5). Since the early 1970s, regulatory tools for social impact assessment (SIA) and environmental impact assessment (EIA) have been developed and have steadily improved since (Vanclay et al., 2015). Former research uses synonyms such as assessment, measurement, reporting, accounting, and others for evaluation (Lall, 2019).

Several classification approaches and different evaluation methods exist. One is the differentiation between single and multisectoral approaches (Agrawal & Hockerts, 2019). Furthermore, classification is often based on the assessment's purpose (Corvo et al., 2021). These purposes are 1) Ex ante determination of all costs and consequences to support decision-making for internal and external stakeholders. 2) Ongoing program monitoring to ensure the maximization of positive and the minimization of negative consequences. 3) Ex-post evaluation of the program's effectiveness.

The literature suggests that in former SIA applications, primarily ongoing and ex-post perspectives were taken. Their results were mainly used for optimizing and gaining political and regulatory approval since the stakeholders were traditionally closely intertwined with politics (Vanclay et al., 2015).

In terms of impact investing in young startups, however, only an ex-ante and, to a limited extent, an ongoing evaluation is possible since the company usually does not have a broad database (Eisele et al., 2002). In addition, Becker and Vanclay (2003) and Esteves et al. (2012) emphasize the importance of ex-ante evaluations to work toward a goal rather than reactive behavior, thereby acquiring internal evaluation expertise early on. Further, integrating external stakeholders early on is stressed (Vanclay et al., 2015). Research on impact investing and startups has grown significantly recently (Islam & Scott, 2022). Literature addresses various topics, such as the measurement and quantification of impact (So & Staskevicius, 2015), recognizing and dealing with mission drift (Cetindamar & Ozkazanc-Pan, 2017), how investors make investment decisions (Butz & Mrożewski, 2021), and more.

In general, we divided relevant papers into two categories. The first deals with the criteria investors apply to select impact startups to invest in from the available options. Accounting research usually refers to this as "due diligence" (Young, 2009). The second type examines the characteristics of impact startups. Up to this point, more research has been conducted from the investor's perspective and has neglected the startups' point of view. Literature exists on, for example, the cognitive patterns of investors when evaluating the social impact of startups (Scholda et al., 2021). At the individual level, investors assess the personal characteristics of the founders and evaluate their integrity (Block et al., 2021). A passion for social change, high professionalism, clear vision and ambitions, and a robust community-based network are essential to investors. However, investors differ in evaluating these personal characteristics (Islam & Scott, 2022). Lack of market knowledge, insufficient financial knowledge, and problems evaluating social impact are hurdles for investments (Phillips & Johnson, 2021).

This research aims to shed light on how to include these and other factors in evaluating the impact of startups. Further, we want to design a general evaluation framework. This way, impact investors and sustainable startups can gain more clarity on the most critical steps and influencing factors to undertake such an evaluation.

3. Methodology: design science research

This research follows the design science research (DSR) approach by Kuechler and Vaishnavi (2008). We investigate the design knowledge for impact due diligence frameworks that enable investors to conduct high-quality evaluations of early-stage impact-driven startups. A DSR approach is particularly suited to address our research problem. It allows us to solve a real-world problem by iteratively designing and evaluating the due diligence framework, hence the artifact's usability and applicability (Hevner & Chatterjee, 2010).

After showcasing the problem in Section 2, our research aims to provide a comprehensive overview and understanding of how impact due diligence can be facilitated for early-stage startups. Hence, to formulate suggestions for the design, we conduct a broad theorizing systematic literature review (SLR) (Wolfswinkel et al., 2013). SLRs have been deployed successfully in sustainable entrepreneurship research (e.g., Trautwein, 2021) and design science projects (vom Brocke et al., 2009). We intend to identify the overlap of different research streams covering SIA and EIA and financing and entrepreneurship. Our SLR was informed by Webster and Watson's (2002) suggestions to conduct a concept-centric literature analysis and Mayring and Fenzl's (2014) recommendations for inductive data analysis.

We considered the full range of scientific literature, such as journal articles, books, conference papers, or dissertations, is considered (Webster & Watson, 2002). We chose the following e-libraries and search engines: EBSCO Business Source Premier, Web of Science, Scopus, IEEE, and Google Scholar. Fig. 1 depicts our search string. We held the query simpler for Google Scholar because the engine does not provide complex search options.

The selection process is shown in Fig. 2. The search results from the various search engines accumulate to 2329 hits. We stopped including publications for Google Scholar if at least 50 consecutive articles appeared irrelevant. The initial results were then reduced successively to 19 publications. We included 62 articles in the final selection through a subsequent citation analysis.

This literature analysis gave us a sound understanding of the problem at hand, which is used for the further tentative design of a solution. According to Kuechler and Vaishnavi (2008), the next step is developing

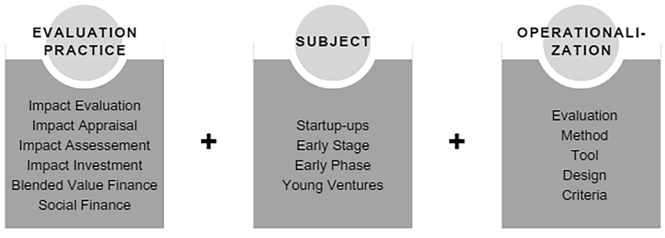

Fig. 1. Search Term Queries, Source: Own Illustration.

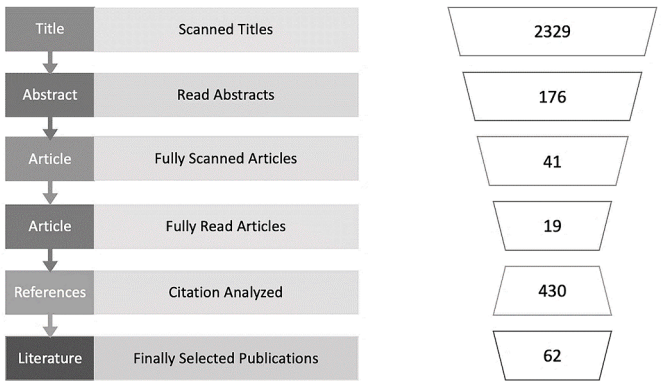

Fig. 2. Systematic Literature Selection Process, Source: Own Illustration.

and evaluating the artifact. For the evaluation of the proposed design, we refer to the framework for evaluation in design science (FEDS) (Venable et al., 2016). We follow the FEDS' recommendation to apply the human risk and effectiveness strategy because a crucial goal of the evaluations is to consistently prove the artifact's benefits in real situations (Venable et al., 2016). The current design cycle conducted a formative evaluation utilizing expert interviews. Hence, the data collected and analyzed in this paper are qualitative, which is common practice in DSR projects (Romme & Dimov, 2021).

All interviews were recorded and transcribed in German, and we coded the transcriptions subsequently in English. We conducted three interviews with one impact-driven founder, one impact investing researcher, and one impact investor specializing in impact startup due diligence. The questionnaire was semi-structured: We first asked the interviewees about their experience with impact due diligence and subsequently presented the framework step by step. We then asked for general feedback, as well as specific strengths, weaknesses, and additional thoughts concerning our proposed framework.

Initially, we conducted trial interviews with two generative AI models (GAIs) representing an impact investor (ChatGPT4) and an impact-driven startup (Bard). The results and the prompts can be found in the appendix. Interestingly, the findings are very much in line with the human expert opinions. Leveraging GAIs is more and more proven to be a valid method for retrieving expert knowledge (Terwisch & Meineck, 2023), even though the output should be treated with caution.

4. Consolidation of current approaches: suggestion

After a first inductive analysis of the identified literature, we assigned the publications to three clusters: 1) Impact Evaluation Science and Models, 2) Impact Investing and Startup Finance, and 3) Artifacts and Design Principles. The clusters are shown in Fig. 3. The articles used in more than one cluster are connected to another cluster. The literature that is used in cluster 1 is marked red. Blue-marked articles are in cluster 2. The literature marked in green originates primarily from the impact evaluation models, discussing underlying design guidelines.

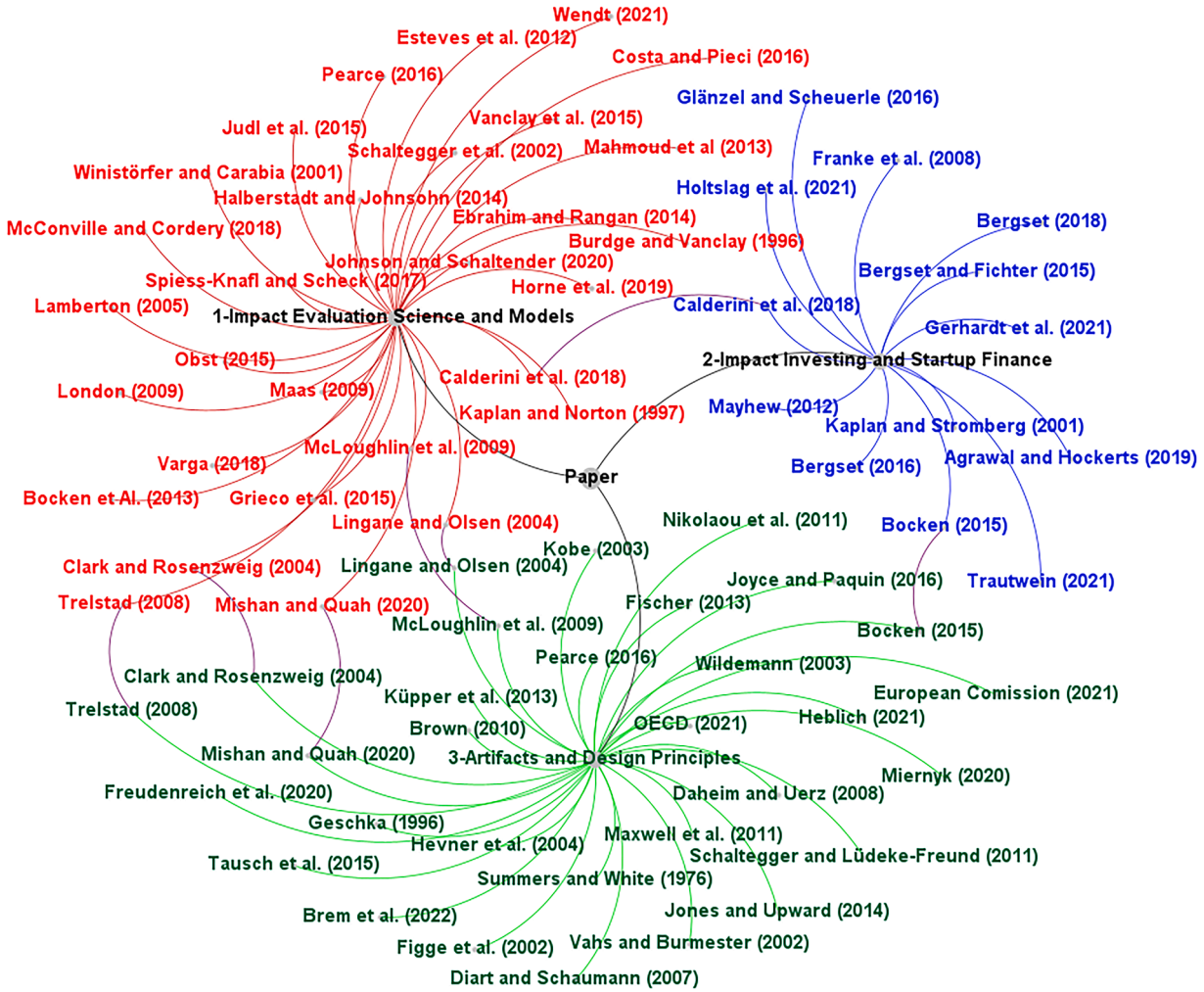

Fig. 3. Identified Clusters from the Systematic Literature Search, Source: Own Illustration.

In clusters 1 and 2, we were able to identify a total of 29 impact evaluation models based on the search terms utilized in the SLR. Only five of the models focus on startups.

In the second inductive coding step, we identified common activities, which we grouped into 13. We assigned them to four stages: the "framing stage", "identification stage", "assessment stage", and "management stage". Fig. 4 shows the result of this process: the conceptual depiction of an impact evaluation. In Western reading, the framework proceeds from left to right. The circular arrows in the background embody the recurring iterations, the ongoing monitoring process, and the non-linear behavior of the model.

In the following sub-sections, the rationale of the framework with its 13 activities will be described in detail based on the findings from the literature.

4.1. Framing stage

The framing stage is the first stage of the evaluation and consists of three groups. The primary purpose of this stage is for the evaluator to delimit the extent of the evaluation.

4.1.1. Defining the scope

Before starting the evaluation, its scope has to be defined appropriately (Bocken et al., 2013; Kaplan et al., 1997; Lamberton, 2005; Lingane & Olsen, 2004; London, 2009; Maas, 2009; Mahmoudi et al., 2013; McLoughlin et al., 2009). For the framing process, the literature recommends the following criteria (Clark & Rosenzweig, 2004): 1) Purpose (i.e., Screening, Monitoring, Reporting, or Evaluation), 2) Timeframe (ex-ante/prospectively/model-based, ongoing/action-based, or ex-post/retrospectively/experience-based), 3) Orientation (input-oriented versus output-oriented), 4) Length of time frame (short-term versus long-term), 5) Perspective (individuals, corporate level, or societal level).

4.1.2. Product awareness

The next step in the framing stage is to reflect on the level of product awareness. Marketers usually use this term to express customers' knowledge about a product. In this context, the term primarily reflects what product information is available to the company and to what degree it is aware of the product's core issues concerning its impact and sustainability (Bocken et al., 2013; Clark & Rosenzweig, 2004; Judl, Mattila, Manninen, & Antikainen, 2015; London, 2009; Maas, 2009).

4.1.3. Conducting research

After setting the evaluation scope and reflecting on product awareness, preliminary research about the fields of influence on the evaluation must be undertaken. This serves to promote the awareness level and is intended to eliminate ambiguities. These fields include, for example, public policies, product alternatives, possible groups of people that are affected, and future assumptions (Bocken et al., 2013; Horne, 2019; Lingane & Olsen, 2004; London, 2009; Maas, 2009; Pearce, 2016; Trelstad, 2008).

4.2. Identification stage

After the framing stage is completed, the identification stage begins. This phase aims to identify the variables and parameters relevant to the defined extent of the evaluation.

4.2.1. Possible impacts

In this step, possible impacts and the risks that are associated with them must be identified (Clark & Rosenzweig, 2004; London, 2009; Maas, 2009; Wendt, 2021). For this purpose, it is proposed to deploy the theory of change by mapping the process and underlying assumptions on how the planned intervention in the impact value chain will achieve the desired impact. The desired impact can be used to trace back on the other components while stating explicit assumptions, thus increasing transparency (McLoughlin et al., 2009). The following questions, adapted from McLoughlin et al. (2009), should be helpful: Is the step logical/meaningful? Does a causal relationship link them? Is it achievable? Are key elements missing? Are the outputs a direct result of the activities? Are impacts plausibly related to the intervention? What is the estimated deadweight?

The deadweight refers to the counterfactual and describes to which extent an observed effect would have occurred regardless of the intervention. The literature shows that other aspects like displacement and drop-off are often discussed in this context. The displacement assesses how much the intervention's outcome displaced other outcomes, for example, when labor is outsourced rather than new employment is created. The drop-off considers the decreasing effect and intervention has over time (Spiess-Knafl & Scheck, 2017).

4.2.2. Risk-Benefit perception

This phase aims to comprehensively present all fears, expectations, and risk perceptions. These risks are related to the unintended impacts of the intervention. This step does not consider the general risk of the venture's failure (Maas, 2009; Mahmoudi et al., 2013; Clark & Rosenzweig, 2004; Vanclay et al., 2015).

Vanclay et al. (2015) differentiate between technical and social risks. Technical risks include physical, structural, engineering, and environmental risks. Social risks can be any possibility that the intervention creates, reinforces, or deepens inequity or social conflict. Potential risks are not easy to measure; still, their scoping should be addressed in the evaluation framework.

4.2.3. Defining KPIs & KIIs

While defining (key) performance-related indicators (KPI) is common practice, defining (key) impact-related indicators (KII) still

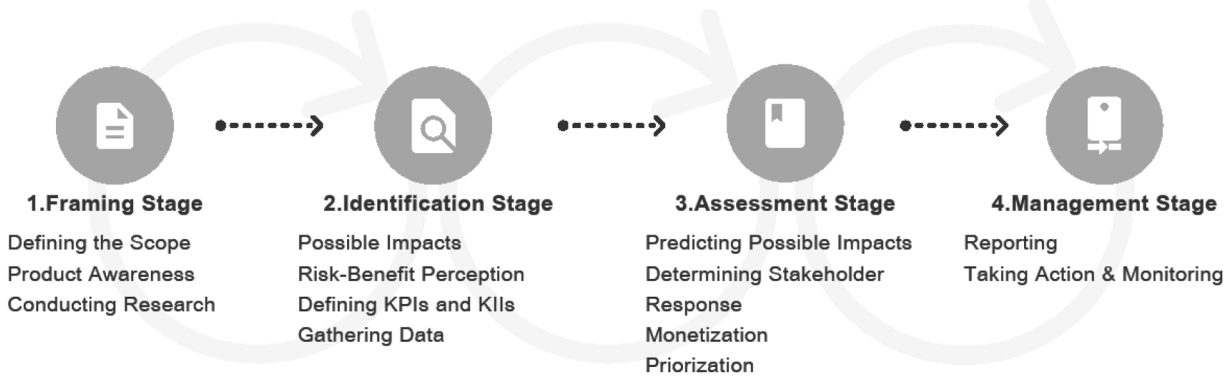

Fig. 4. Impact Evaluation Framework; Source: Own Illustration.

represents a hurdle (Kaplan & Norton, 1997; Mahmoudi et al., 2013; McLoughlin et al., 2009). However, defining relevant indicators that measure likely impacts and any issue that may concern stakeholders is essential for ex-ante evaluations (McLoughlin et al., 2009; Mahmoudi et al., 2013; Winistörfer & Carabias, 2001). Moreover, they represent an efficient and effective solution to monitor ongoing change (Vanclay et al., 2015). Vanclay et al. (2015) state that indicators and a mechanism to monitor the unexpected or cumulative effects should be taken care of to address them quickly.

4.2.4. Gathering data

Data collection is essential to the evaluation's qualitative appraisal and quantification process (Burdge & Vanclay, 1996; Clark & Rosenzweig, 2004; London, 2009; Maas, 2009; Pearce, 2016). However, data is often poorly collected. According to Burdge and Vanclay (1996), deciding which data types are needed and obtaining unbiased and representative data is difficult. Here, a good network can be beneficial. Non-profits and government agencies often provide data for free (Burdge & Vanclay, 1996; Clark & Rosenzweig, 2004; London, 2009; Maas, 2009; Pearce, 2016). Moreover, Burdge and Vanclay (1996) recommend implementing data collection as an activity in the evaluation framework. It should be determined which staff is responsible for the collection, which instruments will be used, and when it should be undertaken. A management system should take control of this.

4.3. Assessment stage

The overall goal of the assessment stage is to determine the significance of the likely impact, the attached risks, and the stakeholders' responses, which were identified in the previous stage.

4.3.1. Predicting probable impacts

At this stage, a detailed study of the potential impact has to be carried out. This includes concretely determining the according probabilities, the relevance, and the extent (Mahmoudi et al., 2013; London, 2009; Clark & Rosenzweig, 2004; Maas, 2009). Burdge and Vanclay (1996) state that social science, especially sociology, tends to be critical and discursive rather than predictive and explanatory, which fails to provide conceptual frameworks for the prediction. In consequence, the interrelationships among variables cannot be displayed correctly. Mahmoudi et al. (2013) claim that more context-based approaches help determine the impacts' magnitude and significance.

4.3.2. Determine stakeholder response

Further, this stage is dedicated to understanding and explaining how different groups of people are affected. In addition, how these groups react to the intervention must be considered to determine the project risk. This includes indirect impacts as well (Mahmoudi et al., 2013). Vanclay et al. (2015) further state that how an individual or the community reacts to an impact depends on how they experience it and if they consider it fair and reasonable. It can range from acceptance and adaption to vigorous objection and protest. The stakeholder's attitudes should be considered. Mahmoudi et al. (2013) find that expectations and fears are often exaggerated, and expected benefits do not meet expectations. In the later stage of this paper, we suggest a feasible mode for this issue concerning startup specifics (see Section 6).

4.3.3. Monetization

The goal of this phase is to complete the quantification process. To achieve this, the insights gained and the data collected must be converted into measurable currency quantities. A universally applicable formula that solves that problem does not exist. Several approaches differ tremendously (Maas, 2009; Mishan & Quah, 2020; Pearce, 2016; Trelstad, 2008; Winistörfer & Carabias, 2001). We find some controversy in the literature about the meaningfulness of applying monetization. Horne (2019) explains that some stakeholders will excessively focus on the monetary value, and other qualitative measures or soft outcomes will be neglected. In connection with the problematic verifiability and the required time, he advises monetization's optional, not mandatory, use.

4.3.4. Prioritization

The creation of a ranking of the predicted impacts and their responses assists in aligning the activities and impacts with the company's most dominant goals and facilitates the subsequent derivation of measures with an efficient allocation of resources (Clark & Rosenzweig, 2004; Maas, 2009; Esteves et al., 2012; McLoughlin et al., 2009; Winistörfer & Carabias, 2001). Furthermore, prioritization prevents the organization from possible mission drift (Spiess-Knafl & Scheck, 2017). Mahmoudi et al. (2013) propose a first categorization into intolerable, tolerable, and acceptable situations.

4.4. Management stage

This stage completes the evaluation framework by reflecting on all findings, deriving measures, and finally applying them.

4.4.1. Reporting

The report should summarize all gained knowledge professionally and derive suitable measures to avoid or at least minimize risks and unwanted impacts, maximize benefits and intended impacts, and optimize the stakeholders' expectations (Clark & Rosenzweig, 2004). The value should be placed on rational and meaningful argumentation and presentation (McLoughlin et al., 2009).

4.4.2. Taking action and monitoring

In this final phase, the evaluation moves into practice. The derived optimization measures are applied and monitored using the previously defined indicators. For this purpose, monitoring intervals are defined (McConville & Cordery, 2018; Maas, 2009).

5. Design requirements for an impact evaluation of startups

The framework presented in Section 4 bundles all activities necessary for an impact evaluation identified in the literature. As mentioned beforehand, we found that only a few of the evaluation methods deal with risks, especially social risks. It may be because risks are already priced in for investment funds or a risk evaluation independent of the impact evaluation is required and integrated into the quantification process. However, some authors, such as Agrawal and Hockerts (2019); Arena et al. (2018); Clark and Rosenzweig (2004); Glänzel and Scheuerle (2016); Maas (2009) and Mahmoudi et al. (2013) consider the integration of risks in the impact evaluation to be unavoidable. Furthermore, Arena et al. (2018) find that the main barriers to finance are the venture's risk profiles, which are higher in young companies.

Sardy and Lewin (2016)) have analyzed the context of risk and impact at the macroeconomic level. To do this, they added an impact ordinate to the two-dimensional risk-return frontier curve. The result is a bell-shaped curve, which is convex towards the origin and is described by them as a stretched sail. They show how impact shifts the entire convex hull to the left of the traditional risk-return curve and, thus, decreases risk while maintaining the same return. It implies that impact investors and the ventures should pursue activities that aim to do just that (Sardy & Lewin, 2016). Therefore, the direct correlation between various risks, returns, and impacts should be examined more closely.

Furthermore, evaluating young startups might imply specific requirements that differ from more mature organizations, as young startups face the challenge of restricted resources (Stinchcombe, 1965; Freeman et al., 1983).

Hence, the conceptual framework must be supplemented by the findings of cluster 2, which refers to the characteristics and risks of such young companies.

5.1. Startup-Specific characteristics and evaluation challenges

Before considering risk-related criteria, this section outlines the startup-specific characteristics that induce requirements for an impact evaluation and business development and financing. These characteristics can change depending on the stage in the startup's lifecycle. This research focuses on the early stages of the company.

5.1.1. Limited resources

Most startups must contend with resource constraints that make operational, tactical, and strategic activities more difficult. It includes limited time, personnel, and especially financial resources. In the early phases of market establishment, significant amounts of capital are required, while revenues are usually poor (Trautwein, 2021). A significant deficit is knowledge and experience in program evaluation but also generally on the business side (Bocken, 2015; Glänzel & Scheuerle, 2016; Trautwein, 2021).

5.1.2. Informal and dynamic structures

Very young companies are characterized by informal structures enabling very flexible and dynamic processes. In terms of innovativeness and culture, this can be of great value. On the downside, it is hard to ensure continuity and replicability (Trautwein, 2021).

5.1.3. Volatility in the business model and the value chain

This flexibility is also required by the low degree of maturity in the business model and value chain since profound changes often occur at short notice. The uncertainty affects the business risk and feasibility of impact evaluation. As the product has entered the market and the business model moves toward a more mature state, the venture prepares for scaling, which requires higher formalization (Trautwein, 2021).

5.1.4. Newness

Due to the very young history of the company, only a limited amount of data is available for evaluation (Glänzel & Scheuerle, 2016). For this reason, the evaluation corresponds more to a predictive, ex-ante evaluation rather than a retrospective, ex-post evaluation used in mature corporations.

5.1.5. Social vision

The willingness and commitment to an impact evaluation are directly related to the company's social vision. The attitude extends over a broad spectrum from purely economic to non-profit goals. Furthermore, in their work, Bergset and Fichter (2015) differentiate between various types of entrepreneurs, who differ in their typology, main characteristics, and primary purposes. These types include environmental entrepreneurs, ecopreneurs, biopreneurs, green, social, and sustainable.

In conclusion, we identified several influencing factors based on the characteristics of early-stage startups. These factors determine the evaluated startup's resources, depth, and goals within the evaluation framework. These factors vary significantly depending on the investee and should be checked in-depth throughout the framework. We thus define the following design requirement (DR):

DR1: The evaluation framework should include the ongoing reflection on influencing factors: startup-related characteristics.

5.2. Risk-Related evaluation criteria

Although the evaluation criteria cover a wide range and their role in impact investing is still emerging (Franke et al., 2008), we identified the four most relevant fields in the examined literature. At this point, we emphasize that these factors can represent success factors if they are positively designed. In addition, individual factors may be closely intertwined and cannot be assigned to just one category. Therefore, they are explained in one category for simplicity and coherence. This applies, for example, to the types of investors and capital allocations, which are explained in the financial factors but are also of central importance to the social factors.

5.2.1. Financial factors

In business ventures, financial risks often come first. They represent enormous hurdles, especially in resource-poor startups. Various literature factors can be grouped into three subcategories: Investment Horizon and Mindset, Capital at the Founding Stage, and Capital Allocation.

5.2.1.1. Investment horizon and mindset. Startups with a social impact mission by definition and long development periods have a long-term mindset. However, traditional investors focus primarily on fast return cycles and high-profit margins, mostly assumed to be found in tech, like mobile applications (Agrawal & Hockerts, 2019; Bergset, 2018; Bocken, 2015). This indicates the importance of goal alignment, which is explained in detail in Section 5.2.5.

5.2.1.2. Capital at the founding stage. One motive for this research is to improve the capital availability of young companies. Accordingly, it is unsurprising that this factor is crucial for founders and investors. If the company has sufficient financial resources and support mechanisms, this usually leads to a significant reduction in the investor's financial risk. Early on, it should be determined which kind of capital is helpful to the venture in the specific situation, for example, borrowed capital, to optimize financial management (Bocken, 2015).

5.2.1.3. Capital allocation. The composition of existing or required capital packages, i.e., the capital structure of young companies, should be more precise. This creates risks not necessarily due to liquidity bottlenecks (Arena et al., 2018; Bergset, 2018; Block et al., 2021; Bocken, 2015).

5.2.2. Product/Service factors

The next category of critical factors is the actual product or service. Here, also, the literature provides a variety of evaluation criteria, of which the most relevant are listed.

5.2.2.4. Business model. Studying the business model should be included in all evaluations. Bergset (2018) and Glänzel and Scheuerle (2016) find that impact investors, in that case, VC firms focus on market-ready ventures with matured business models. Bocken (2015) and Gerhardt et al. (2021) add that great importance must also be attached to the reliability of the supply chain infrastructure. They also state that many entrepreneurs are generally missing a business background and, thus, are incapable of implementing and proposing a proper business model.

5.2.2.5. Innovativeness. In their empirical studies, Bocken (2015), Gerhardt et al. (2021), and Block et al. (2021) show that innovative business models are seen as a criterion for success. Thus, innovativeness plays a central role.

5.2.2.6. Scalability. The degree of scalability of a product gives the investor information about the company's growth potential and is, therefore, an indicator of profitable investments. For impact investors, scaling the social output is usually also necessary. When scaling, however, startups must be careful not to exhaust the running capital (Agrawal & Hockerts, 2019; Block et al., 2021; Gerhardt et al., 2021).

5.2.2.7. Replicability and differentiation. This factor can be interpreted in two directions. On the one hand, the degree of differentiation of the product plays an important role, which provides information about how the product differs from other market solutions, what social benefits it comes with, and how difficult it is to imitate it (Franke et al., 2008). On

the other hand, it describes the product's ability to standardize, which is relevant for scaling, quality management, and customer requirements (Gerhardt et al., 2021).

5.2.2.8. Importance and attractiveness of the product. It is known from market research that the diffusion of an innovative product in the market goes through several adoption phases until the majority of society recognizes its added value (Franke et al., 2008). Nevertheless, evaluating the product's importance and attractiveness and presenting it to the investor is of central relevance. This is especially true for investors not specialized in the relevant market (Block et al., 2021).

Overall, it seems that within the evaluation, classic economic reporting tools, such as the business model canvas (Joyce & Paquin, 2016) or the balanced scorecard (Figge et al., 2002; Schalltegger & Lüdeke-Freud, 2011) should be utilized but adjusted with a social and an environmental performance measurement. Overarching lays the idea of clearly defining the value of the business idea and depicting the goals and needs of the venture (Bocken et al., 2013; Jones & Upward, 2014). It is further essential to align the values and expectations of the investor and investee (Heblich, 2021).

5.2.3. Market factors

Scholarly literature shows that the category market must be included in the evaluation. Since these are well-known factors (Bocken, 2015; Kaplan & Stromberg, 2001), this section briefly lists them.

5.2.3.9. Market size. The market size describes the total potential number of sales or customers within a given industry (Bocken, 2015; Kaplan & Stromberg, 2001).

5.2.3.10. Competition. In addition to the market potential, its players and their products must also be considered. This is used to estimate the market share. Market observation also plays a vital role in benchmarking and differentiation (Kaplan & Stromberg, 2001).

5.2.3.11. Marketing. The reflection of the communication of product information to the target group is of enormous importance for a company's success. It must, therefore, be part of the evaluation (Bocken, 2015).

5.2.4. Social factors

Social factors are the final category of critical factors that determine a company's risk-reward continuum.

5.2.4.12. Entrepreneurs social network. Scholarly literature shows that social capital, which is based on social networks and collaborations, contributes mainly to the success of social ventures (Arena et al., 2018; Bocken, 2015; Franke et al., 2008). Bocken (2015) also states that social capital firms involved in a better network are better at selecting and building up successful companies. According to Arena et al. (2018), a venture's embeddedness in the community, members' support, and affiliation to networks represent intangible, competitive advantages and, thus, collaterals for investors.

5.2.4.13. Managerial competence. The lack of management skills and leadership experience reduces the financial return suspects and, thus, reduces the absorptive capacity for investments (Glänzel & Scheuerle, 2016; Kaplan & Stromberg, 2001; Franke et al., 2008; Agrawal & Hockerts, 2019). These skills include personality traits that are linked to the management and the completeness of the management team (Kaplan & Stromberg, 2001).

5.2.4.14. Dedication and composition of the team. Like capital allocation, the team members' skill composition and dedication are crucial when screening a venture. Soft factors such as the degree of harmony in the team, communication skills, motivation, and many more are of great importance (Bocken, 2015; Kaplan & Stromberg, 2001). According to Agrawal and Hockerts (2019), Bergset (2018), Block et al. (2021), and Franke et al. (2008), many investors focus on individual and aggregated industry experience, the field of education, et cetera. Moreover, Bergset (2018) states that investors seeking innovative startups prefer engineering over economics and business-related skill sets.

5.2.5. Aligning for impact

Although ensuring accountability is not a new problem limited to social ventures, it is more difficult since multi-stakeholder and multi-objective approaches need to be applied (Arena et al., 2018; Glänzel & Scheuerle, 2016; Mayhew, 2012). When (social) entrepreneurs and (impact) investors form strategic alliances, these alliances are characterized by the strategy and form of their relationships. To accomplish a symbiotic funder-funded relationship, a high degree of goal alignment is mandatory (Agrawal & Hockerts, 2019; Mayhew, 2012). This section provides insights into the factors and problems one must solve to accomplish the degree of goal alignment.

5.2.5.15. Human factors and collective dynamics. As mentioned, various stakeholders and individuals are involved in the evaluation and accounting process. That means people/groups with different values, attitudes, professional backgrounds, positions, and intentions pursue their goals (Glänzel & Scheuerle, 2016). According to Glänzel and Scheuerle (2016), personal, biological, and habitual traits like (body) language, age, gender, appearance, and manners also play an essential role. Thus, a fair decision-making procedure enforces an understanding of the given factors and the inclusion of the interests of all these groups. Ideally, the goals and values are as close together as possible (Agrawal & Hockerts, 2019). The transparency of values is of particular importance in communication. The focus should not only be on the social added value if the intrinsic focus is on financial return (Agrawal & Hockerts, 2019). At all events, it is necessary to identify and investigate potential conflicts of interest between the parties (Arena et al., 2018).

5.2.5.16. Principal-Agent and adverse selection problem. Literature shows that the lack of an impact evaluation framework strongly limits the development of social firms and worsens the asymmetry of information (Arena et al., 2018; Bocken, 2015; Calderini et al., 2018; Glänzel & Scheuerle, 2016). It results in one of two problems: First, the principal-agent problem mainly arises from different risk preferences of the parties before capital has been invested. The investor (principal) uses the entrepreneur's (agent) dependency to his advantage and dominates the decision-making (Arena et al., 2018; Bocken, 2015; Glänzel & Scheuerle, 2016). Secondly, the adverse selection problem arises after capital has been transferred. It is characterized by the entrepreneur's moral hazard and opportunistic behavior by taking higher risks than agreed upon (Arena et al., 2018; Bergset, 2015; Bocken, 2015).

The findings support that performance measurements and a more collaborative impact evaluation or a more collaborative relationship influence evaluation practices (Arena et al., 2018; Mayhew, 2012). Since more complex alliances can benefit the venture's success, entrepreneurs must select investors they want to retain more closely. The decision should be based on the long-term coordination or collaboration the investors offer (Mayhew, 2012).

Mayhew (2012) also points out that evaluation costs may decrease as it becomes an integrated instrument in the program. It is thus an advantage if startups keep track of their impact from the beginning and develop evaluation expertise.

5.2.5.17. Contracts. Glänzel and Scheuerle (2016) find that social impact is a central criterion in contract negotiations for VC investors, especially where entrepreneurs perceive it as less relevant. However,

entrepreneurs must be aware that social return is a key performance indicator (KPI) and a (unique) selling point (USP) to the investor.

On the financial side, the transfer of various rights, like cash-flow voting or liquidation, is considered in the contract. The VC carries out the allocation of these rights based on the venture's performance. If the performance is good, the VC waives its control and liquidation rights but retains its cash flow rights. The opposite is the case when the company is performing poorly. The VC then takes over control (Kaplan & Stromberg, 2001). Furthermore, investors' noncompete and vesting provisions, standard in early phases, can lead to a hold-up problem, as they impede the entrepreneur's exit by making it more expensive (Kaplan & Stromberg, 2001).

In summary, with increasing information asymmetry, investors raise the sensitivity of the entrepreneur's equity compensation functions through performance-oriented contract elements. This creates a high risk of mission drift (Bergset, 2015; Bergset, 2018; Kaplan & Stromberg, 2001; Agrawal & Hockerts, 2019). Whether this stands in the way of achieving social goals must be questioned as part of an impact evaluation.

5.2.5.18. Monitoring. Monitoring is an essential part of (impact) evaluation. It determines to which extent the VC is willing to get involved in operations since the involvement is estimated ex-ante and thus usually underrated. It often involves recruiting, developing the business model, facilitating strategic relationships, and other activities (Kaplan & Stromberg, 2001). The funders expect appropriate outcomes in return for the high transaction costs and efforts (Bergset, 2015). Bergset (2015) states that mentoring could be even more effective since it increases the entrepreneurs' skill set.

In order to identify critical factors and possible impacts, it became evident that a sufficient degree of creativity is mandatory to increase associative ability (Vahs & Burmester, 2002). However, stimulating creativity alone is not enough. For this reason, in addition to the pure identification methods, creativity techniques seem to be of high importance as well (Summers & White, 1976; Geschka, 1996; Tausch et al., 2015; Brown, 2010; Wildemann, 2003; Nikolaou et al., 2011; Kobe, 2003; Brem et al., 2022; Freudenreich et al., 2020).

Evaluation methods can be utilized to attach qualitative and quantitative values to the identified factors, such as timeline/trend exploration or different scenario techniques (Daheim & Uerz, 2008; Vahs & Burmester, 2002). Other research focuses more on an easy-to-conduct, indicator-based input-/output analysis and forecasting (Miernyk, 1966; Diart & Schaumann, 2007; Vancley et al., 2015), and tools that support decisions based on customer feedback or network engagement (Fischer, 2013; Maxwell et al., 2011; Vahs & Burmester, 2002). The classical financial analysis (Pearce, 2016; Mishan & Quah, 2020) should be aligned with social or ecological criteria (Trelstad, 2008; Clark & Rosenzweig, 2004; Lingane & Olsen, 2004; Maxwell et al., 2011).

Concluding this section, we identified various critical influencing factors for an impact evaluation of (young) companies, which we grouped into four categories. These are financial, product, market, and social factors. Within the evaluation, these descriptions assist the evaluator in identifying the factors in their subject of interest and the risks attached to them. We also find that all four categories are of essential importance. Further, the alignment for impact between the investor and the investee is essential, for which the different values, viewpoints, and goals must be considered. We thus define the following DRs:

DR2: The evaluation framework should include the ongoing reflection on influencing factors: startup-related risks.

DR3: The evaluation framework should incorporate an ongoing "checks-and-balance" to ensure an alignment for impact between investor and investee.

5.2.6. Design guidelines

This section outlines the design guidelines identified in the literature (cluster 3) that are central to ensuring high-quality impact evaluation practice.

The engagement of stakeholders in the impact evaluation helps to improve the understanding of the issues seen from different perspectives. Moreover, collaborative deliberation can increase access to evidence before assessing various options. Eventually, stakeholder participation and deliberation can achieve a more holistic and accurate valuation (Maxwell et al., 2011).

European Commission, 2021 has defined specific dimensions to analyze the impact of an intervention on its stakeholders: 1) *Utility* describes the extent to which the impact of an intervention satisfies stakeholder needs. The different stakeholder groups must be differentiated. 2) *Equity* analysis measures the impact distribution within society and various stakeholder groups and examines its fairness. 3) *Acceptability* describes the intervention's perception and role in the target group and how it changes.

We identified general criteria to support consistent and high-quality evaluation. The criteria provide a generic framework and consistent language, which induces standardization and comparability of various evaluations (European Commission, 2021; OECD, 2021). However, to maximize quality and avoid redundancy or unnecessary work, the evaluators have to consider the relative value each criterion will add. This can be done by deciding if the criterion is vital for the evaluation and has yet to be included in previous steps and if it is feasible to answer the related questions (OECD, 2021). Six main criteria should be considered: 1) Relevance, 2) Coherence, 3) Effectiveness, 4) Efficiency, 5) Impact, and 6) Sustainability (in terms of lasting impact) (European Commission, 2021; OECD, 2021).

Furthermore, McLoughlin et al. (2009) emphasize some principles for mapping along the impact value chain: 1) *Honesty*: The outcomes should reflect the honest representation of the participant and are free from intentional distortions. 2) *Robustness and Defensibility*: The argumentation is coherent and stands up to criticism. 3) *Verifiability*: The decisions are based on evidence and are verifiable. These principles should guide every evaluation.

Adjusting the initial impact evaluation framework towards the impact due diligence of early-stage startups requires DPs. The relevant principles were developed based on the startup-specific DRs and identified guidelines. Based on the CAMO or CIMO logic, we apply the design principle framework by Gregor et al. (2020), which suggests to formulate DPs consisting of the "aim, context, mechanism, and (if applicable) rationale and to consider the roles of stakeholders in the relationships among these elements" (p. 28). We present the DPs for startup-specific impact due diligence in Table 1.

6. Conceptual impact due diligence for startups: development

Based on the formulated DPs, Fig. 5 depicts the conceptual impact due diligence framework for early-stage startups. In addition, we assume that this can be used for undertaking evaluations in the companies' further lifecycle stages. However, it is necessary to point out that the critical factors within the risk categories may change. In this version, the impact due diligence comprises the initial evaluation process into two levels.

The framework spans a two-dimensional shell of activity groups and factor categories. It maintains the necessary degree of clarity while at the same time deviating from strict linearity, which allows for lateral thinking. Although linearity provides easy understanding, this latitude is necessary to clarify the iterative and interconnected nature of the evaluation. In this adapted version, investors and startups are intertwined equally, which suffices the vital inclusion of stakeholders (Maxwell et al., 2011; Vanclay et al., 2015). Through this, a better understanding between the two parties is promoted. Furthermore, affordability is ensured for startups due to the active engagement of the investor.

The framework starts at the top left and proceeds down left, up right,

Table 1
Design Principles for Startup Impact Due Diligence.

Building block	DP 1	DP 2	DP 3	DP 4	DP 5
Aim	To promote understanding	To achieve an easy-to-use artifact	To facilitate a comprehensive and holistic artifact	To achieve an affordable impact due diligence	To ensure impact alignment
Context	…in impact investing of startups	…in impact investing of startups	…in impact investing of startups	…in impact investing of startups	…in impact investing of startups
Mechanism	…ensure that both actors are mutually included in the due diligence	…consider startup-related risks and characteristics	…consider startup-related risks and characteristics	…consider startup-related risks and characteristics	…ensure that both actors are mutually included in the due diligence and consider startup-related risks and characteristics
Rationale	…because this supports the necessity to communicate and gain knowledge from various points of view.	…to tackle the issue of scarcity of time and expertise to implement highly complex methods.	…to address the complexity of the process and the need to keep it as simple and sufficient as possible at the same time.	…to address the lack of resources of the startup and the need to involve external experts. This takes the required time into account.	…to minimize the principle-agent and adverse selection problem.

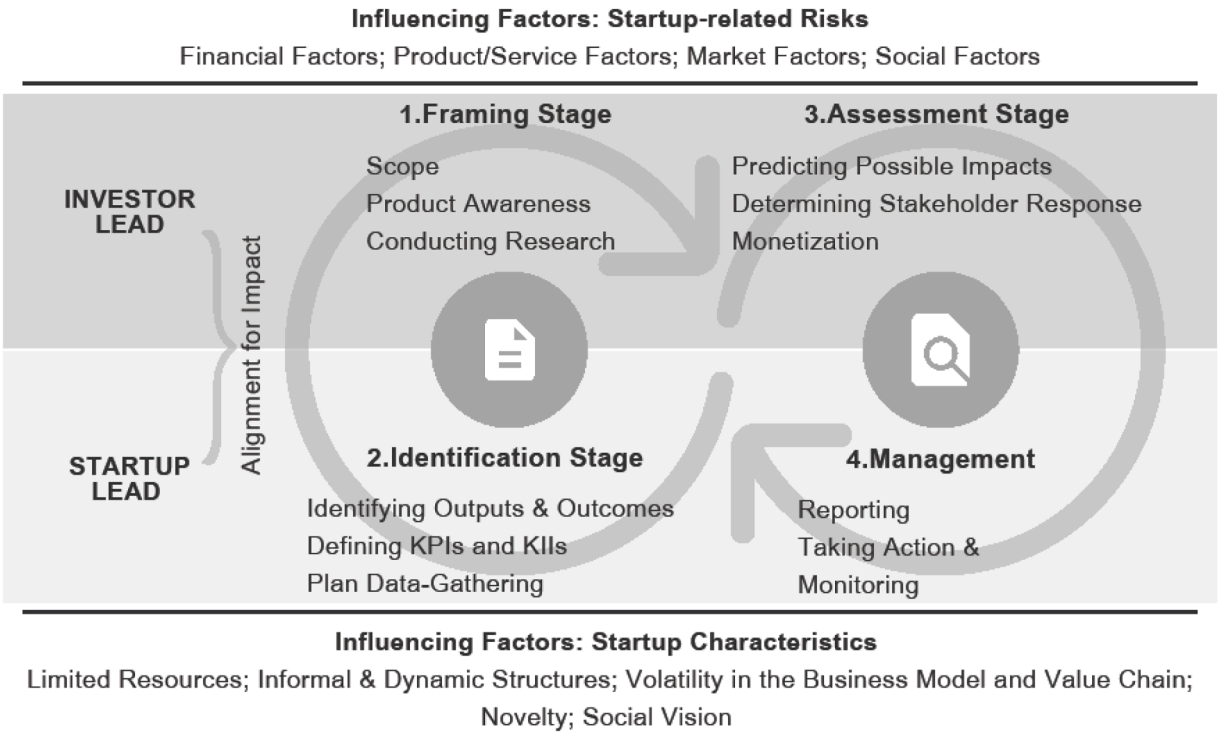

Fig. 5. Impact Due Diligence for Startups, Source: Own Illustration.

down right, step by step. Initially, in the framing stage, the investor sets the scope, ensures product awareness with an overall market perspective, and conducts research to compare the startup to potential competitors or alternative solutions. In the second phase, the identification stage, the startup takes the lead and identifies input-specific outputs and outcomes. Based on this, KPIs and KIIs, which are closely aligned with the impact, can be formulated collaboratively. The startup then plans data collection to track the KPIs and KIIs. The third phase, the assessment stage, again occurs on the investor level, as predicting the overall impact is a resource-binding activity. Also, stakeholder response should be determined on a macro level, for example, via trend analyses or scenario techniques with other sector experts. Monetization is an explicit goal of the investor; hence, the activity should be in their focus, even though the startup has to provide the data. This is reflected in the last phase, the management stage. The startup ensures the overall management of all the activities necessary to provide the investor and other stakeholders with relevant data. Any further actions are decided and translated into activities by the startup itself.

Due to its lemniscate design, forward and backward movement along the process is ensured. For example, this can be the case when a risk factor or a possible impact requires more specific research. Startup-specific factors enclose the overall process: 1) Investor-related: Risk Criteria; 2) Startup-related: Startup Characteristics. The integration of risk analysis into the evaluation process and the attention to specific characteristics is new compared to the former depiction of an impact evaluation. Both factors guide all steps in the process. Its need is derived from interdisciplinary literature research and thus represents a transfer service that helps close the scientific gap.

7. Alpha testing of the artifact: evaluation

Considering the feedback from the three expert interviews, overall, our design supports an impact due diligence of startups. The interviews helped us identify the most critical factors for applying the framework in practice. Table 2 summarizes the main findings.

Interestingly, the most contradictory finding concerned the inclusion

Table 2
Main Findings from Expert Interviews.

Strengths	Weaknesses
• Ensures impact alignment • Fosters structured and ongoing evaluation, provides step-by-step guidance • Adaptable to startup needs/resource constraints, considers startup-related risks and characteristics • Fosters comparability of startups • Mutual inclusion of investor and startup, promotes understanding • Practically applicable, promotes effective process • Scientifically rigor and relevant	• Only applicable for startups with a track record, or higher investment sums (later than seed stage) • No consideration of heterogeneity of impact investors • Time-consuming and resource-intense • Division of responsibilities (investor vs. startup) might lead to confusion, if not clearly defined • Required continuity of cooperation • Defining KPIs / KIIS at an early startup stage
Recommendations	
• Differentiation for different impact investor types and startup stages, as well as sectors • Wording: "Investor-Identified Risks" on the upper part • Clarify the roles and responsibilities of investor and startup • Develop a toolkit and showcase use cases on how to apply the framework; provide more detailed guidance on individual steps, provide a time frame	

and development of KPIs and KIIs during the due diligence. While the impact investor considered it too early or complex to define KPIs and KIIs, the researcher pointed out that an investor usually sets up KPIs and KIIs before any screening. The startup highlighted the inclusion of KPIs and KIIs positively, as it moves beyond qualitative assessments to quantifiable impact measures. As our framework suggests, measuring output level KPIs could be the way forward, while pre-defined impact goals guide the process.

Further, while the startup appreciated the continuation of the due diligence beyond the initial screening phase, it was pointed out that a continuation is not always the case, according to the researcher. Lastly, the framework might be too advanced to apply at a very early stage of venture formation: an existing track record would be the optimal stage.

Nevertheless, our interview partners highlighted the framework's flexibility, as it should not be understood as a strict guideline. Hence, it can support both actors in defining necessary and relevant activities at different stages.

Current empirical research bolsters our approach, as it highlights the task of the impact investor to focus on helping their investees plan their social and environmental impact, measure it, ensure it is locked within the business model, and finally, report it to stakeholders (Nachyla & Justo, 2024). Overall, our alpha testing proved the framework's overall setup.

8. Conclusion

This study addressed the startup-specific challenges of an impact evaluation process, combining the investor and investee perspectives. The startups' conceptual impact due diligence includes grouped activities and critical factors from several publications. Additionally, it incorporates three DRs and five DPs, making it a comprehensive concept. With these, we contribute to the intersection of design science and entrepreneurship as well as impact assessment, which is still an evolving field (Romme & Reymen, 2018).

The framework's comprehensiveness makes it relatively complex. In addition, the proposal does not specify the context, like company size or industry. Depending on the application, this allows specifications to tailor the evaluation to individual needs. Further, we want to highlight the emphasis on the alignment for impact, which entails an ongoing reflection and adjustment of the investor and startup viewpoints. This should minimize information asymmetry and avoid mission drift (Cetindamar & Ozkazanc-Pan, 2017).

To evaluate our design, we conducted alpha testing with three experts from the field of impact investing. The overall feedback supports our initial framework design yet concluded with the most prominent limitation concerning the complexity at the early stages of venture formation.

This proposed framework poses the main limitation of this research. Currently, we only present a conceptual design with a first alpha testing. Nevertheless, the rich and interdisciplinary literature included in the development offers a good and sound starting point for further design cycles. The limitation also predicts the next steps of the DSR project. The artifact can be tested and evaluated in a natural and summative way. This way, the overall effectiveness of the framework can be tested, and necessary adjustments can be included.

Further research could also address the four individual stages of the framework and dive deeper into the different methods and tools that can be utilized to support the identified activities. In sum, our science-based design provides a relatively new perspective on researching and practicing the impact due diligence of startups.

CRediT authorship contribution statement

Christin Eckerle: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Orestis Terzidis:** Writing – review & editing, Supervision, Methodology.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data will be made available on request.

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Supplementary materials

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