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Distributed Decision-Making in Organizations – Evidence from Idea Evaluation Systems

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1 Introduction

1.1 Motivation and Research Questions

Over the last decades, we have been experiencing massive advances in the adoption of digital technologies, which have led to extraordinary transformations in our society, organizations, and businesses (see, e.g., Lanzolla et al., 2020; Yoo, Boland, Lyytinen, & Majchrzak, 2012). This adoption of digital technologies has begun to affect a wide range of internal operations and processes in organizations. For example, this adoption has the potential to change the way organizations define their required tasks, how they divide, group, and assign them to their employees, and how they can monitor proper execution and completion (Kretschmer & Khashabi, 2020).

Particularly important for this thesis is that this adoption has begun to affect how decision-making in companies is organized (Nambisan, Lyytinen, Majchrzak, & Song, 2017; Yoo et al., 2012). Increasingly, companies in many sectors have implemented technologies and tools which open up idea evaluation to employees throughout the company. They do so via distributed idea evaluation (Reitzig & Sorenson, 2013), prediction markets (Soukhoroukova, Spann, & Skiera, 2012), and internal crowdsourcing (Malhotra, Majchrzak, Kesebi, & Looram, 2017).

These new approaches to distributed decision-making appear promising for a variety of reasons. For example, they promise better integration of many stakeholders' perspectives (Weiser, Jarzabkowski, & Laamanen, 2020), advantages to the division of work (Raveendran, Puranam, & Warglien, 2021), reduction of overload for managers (Yukl & Fu, 1999), enhancement of speed and quality decisions (Yukl & Fu, 1999), and an increase of employee motivation and enhanced efficiency (Gambardella, Khashabi, & Panico, 2020).

Trying to harness these advantages of distributed decision-making and following a trend toward democratizing innovation (Hippel, 2006), firms such as Audi, Daimler, IBM,

Kühne+Nagel, Lufthansa Systems, and Siemens have recently started to adopt *internal crowdfunding* (see also Feldmann & Gimpel, 2016; Feldmann, Gimpel, Muller, & Geyer, 2014; Muller, Geyer, Soule, Daniels, & Cheng, 2013) as a tool to implement distributed decision-making. Internal crowdfunding is "*…primarily used to foster innovation and collaboration among employees, who propose and evaluate project ideas on Intranet platforms by allocating company money."* (Simons, Kaiser, & Vom Brocke, 2019, p. 118)

While studies on methods such as crowdsourcing and internal crowdsourcing, in which participants propose ideas, are increasingly attracting researchers' attention, studies on internal crowdfunding are still sparse (Simons et al., 2019; Zuchowski, Posegga, Schlagwein, & Fischbach, 2016). This paucity of research is surprising considering that the potentially large numbers of ideas created through such methods also amplify the issue of evaluating and selecting the best ideas for implementation (Bayus, 2013; Bjelland & Chapman Wood, 2008; Ozer, 2009; Piezunka & Dahlander, 2015; Sutton, 2010; Toubia & Florès, 2007).

To strategically renew and create a competitive advantage, firms need to capture employee ideas and select the best projects and initiatives for implementation (Deichmann & Jensen, 2018; Reitzig & Sorenson, 2013). With many more ideas than in the past needing to be vetted before selection (Piezunka & Dahlander, 2015), companies increasingly involve employees in distributed idea evaluation methods, such as internal crowdfunding, in order to address this challenge.

Although internal crowdfunding appears to be a promising new possibility for distributed decision-making and distributed idea evaluation, many questions remain unanswered. Three sets of questions are especially pressing and motivate this dissertation.

First, how should firms design and use this cutting-edge tool to capture the alleged benefits? What are relevant design principles and trade-offs? Second, other important questions are related to the quality of the decisions that managers can expect when implementing

distributed decision-making tools. How economically sensible is it to make decisions in this way? What bounds the usefulness of distributed decision-making, and when are other forms of decision-making (e.g., experts or managers) more efficient?

The third set of essential questions relates to how firms can shape outcomes of distributed decision-making in ways that support the firm's objectives. Many internal crowdfunding initiatives are designed to work without managerial oversight. If an idea gets the requested funds, it proceeds to the implementation phase, often without further management approval. Why do employees not invest in an idea that proposes building a beer garden at the local office? Which instruments for managerial control are feasible to manage distributed decision-making effectively?

By exploring internal crowdfunding as a new form of distributed decision-making for idea evaluation in firms, this thesis aims to shed more light on these critical sets of questions. The first study will investigate the benefits and challenges of internal crowdfunding and discuss helpful design features that managers wishing to build an internal crowdfunding campaign should observe. Therefore, the first study, a paper intended to be published in a journal that reaches beyond academic circles to practitioners, will try to answer the following research question:

> *RQ1: What design principles and trade-offs affect the functioning of internal crowdfunding?*

These new tools for distributed decision-making, inter alia, promise to tap into knowledge distributed throughout an organization (Colombo, Foss, Lyngsie, & Rossi Lamastra, 2021) or to overcome authority's dampening effect on subordinates' motivation (Fehr, Herz, & Wilkening, 2013; Klapper & Reitzig, 2018). Unfortunately, they may also introduce new sources of inefficiency, which must be better understood in order to choose the best decision-making type in a given situation.

By adopting distributed idea evaluation tools, firms may hope to reduce idea evaluation biases in centralized, hierarchical organizational forms (e.g., Fuchs, Sting, Schlickel, & Alexy, 2019). However, distributed decision-making may also open the door to new biases. Extant research into participative decision-making systems has shown that employees favor ideas from their business unit (Reitzig & Sorenson, 2013) and give lower scores to others' ideas that are thematically close to their work (Boudreau, Guinan, Lakhani, & Riedl, 2016). Furthermore, they overvalue their own ideas (Keum & See, 2017) and undervalue coworkers' ideas due to competition for finite resources and "turf wars" (Criscuolo, Dahlander, Grohsjean, & Salter, 2017). There is also an emerging discourse about biases in idea evaluation in organizations, which examines and compares biases in centralized (Criscuolo et al., 2017; Hegde & Tumlinson, 2014; Keum & See, 2017) and distributed forms of organizing (Greenberg & Mollick, 2017; Hwang, Singh, & Argote, 2015; Reitzig & Sorenson, 2013).

The second study in this dissertation seeks to contribute to this emerging understanding by shifting the focus to organizational hierarchy itself – a key aspect of organizational structure that distributed decision-making is supposedly free of. Distributed decision-making allows for upward, downward, and peer evaluations, leveling the hierarchical high ground into a supposedly hierarchy-free, egalitarian sphere (Klapper & Reitzig, 2018; Reitzig & Sorenson, 2013). The study examines whether hierarchy still plays a role in distributed idea evaluation systems in which decision-making authority is diffused to a crowd of employees by investigating:

RQ2: Whether and how does hierarchical similarity between ideators and evaluators bias idea selection in decentralized decision-making?

The delegation of decision-making authority over innovation decisions (such as idea evaluation) may also come at the cost of losing control (e.g., Aghion & Tirole, 1997). For traditional settings, practitioners and scholars have developed and investigated a range of tools

to mitigate potential agency problems and elicit desirable employee behavior. For example, they studied monetary incentives and compensation (e.g., Gneezy, Meier, & Rey-Biel, 2011), awards (e.g., Gallus & Frey, 2016), and social rewards such as managerial recognition (Gallus, Jung, & Lakhani, 2020).

Yet, the use of these instruments is especially difficult in distributed decision-making. First, one of the key reasons why firms use the delegation of decision rights to their employees is to harness the positive motivational effects of autonomy (Gambardella et al., 2020). Unfortunately, using financial instruments may be counterproductive since it can crowd out intrinsic motivations (Gneezy et al., 2011) and is of limited value in promoting autonomous motivation (Stone, Deci, & Ryan, 2009) essential for distributed decision-making. Second, suppose firms delegate decision-authority to front-line employees to profit from their informational advantages (e.g., their tacit customer need knowledge, etc.). In that case, it is not always feasible to use traditional instruments that require the ex-ante definition of desired behavior to measure against. Third, tools such as awards may also be unviable if employees' efforts are difficult to observe and the value of their outputs is unknown or can only be honored with a time lag (Gambardella, Panico, & Valentini, 2015).

To overcome these challenges, Study 3 introduces framing as a new and promising instrument for managerial control of distributed decision-making. One way to frame the distributed decision-making task is to focus on the goals of the central organization or the goals of the involved actors (e.g., the involved idea creators in an idea evaluation task). Thus, Study 3 asks:

RQ3: Whether and how does the framing of the distributed decision-making task affect decisions if the task is framed toward furthering organizational goals vs. peer goals?

Figure 1 summarizes the research questions.

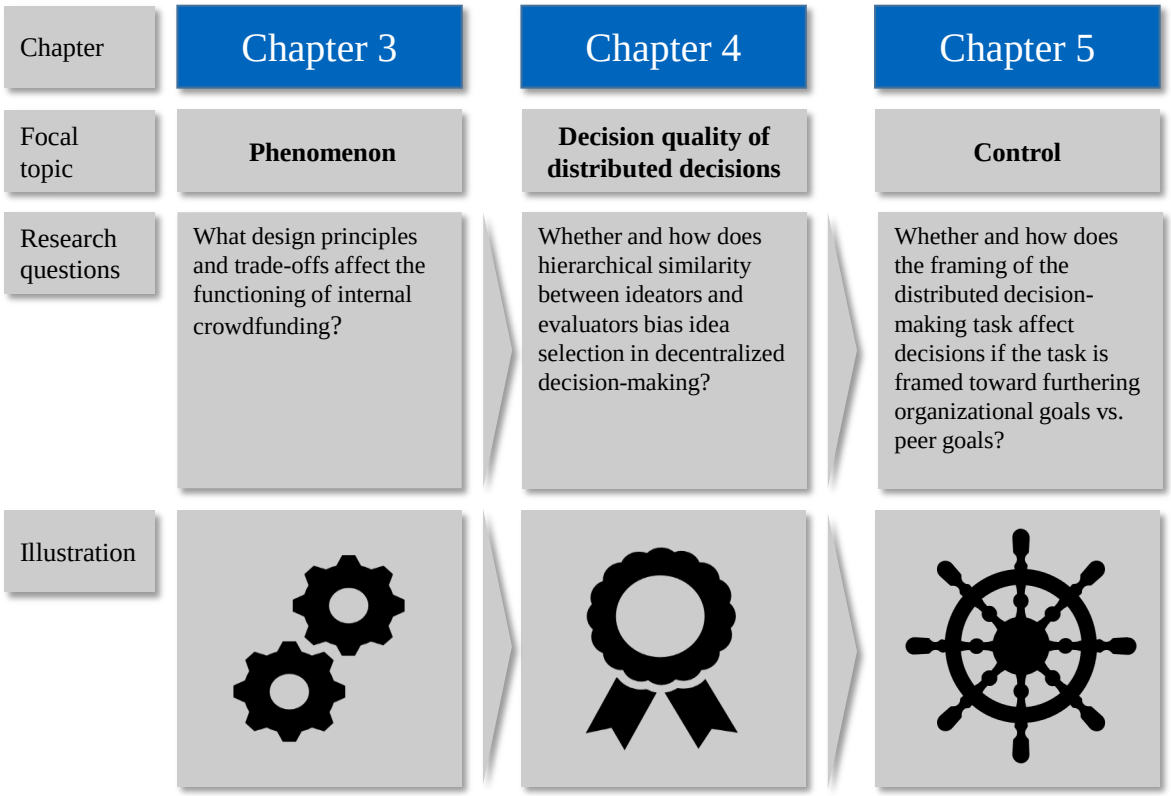

Figure 1 Summary of Research Questions

1.2 Research Approach

In the following, I will provide a concise overview of the different research approaches taken in the three studies. Each study in this dissertation provides further details on methods, data collection, and analyses.

To answer the research questions, I adopt qualitative and quantitative methods in a sequential exploratory approach (Creswell, 2009). This approach allows us to explore a phenomenon but also to expand quantitatively.

Firms have only recently begun to use internal crowdfunding as a tool for distributed decision-making. Due to the paucity of research on the phenomenon, the first study aims to shed more light on the phenomenon and tries to generate more insights into it by adopting an exploratory and qualitative approach. Specifically, the first study is a multiple-case study of three large firms that have adopted internal crowdfunding. Four semi-structured interviews with platform managers and 22 interviews with idea creators were conducted, transcribed, and analyzed. Secondary sources, such as archival documents, reports to top management, and idea evaluators, complemented the understanding.

This dissertation investigates the research question in the second study by employing the hypothetico-deductive method (Creswell, 2009). To explore the research question of whether hierarchical similarity bias affects the selection of ideas in distributed decision-making systems, we test our hypotheses in both a cross-sectional data set from an internal crowdfunding contest and an online experiment. The combination of field analysis and an online experiment helps to articulate the proposed mechanism.

The third study similarly deductively tests hypotheses to answer the research question. A field experimental approach is chosen to advance our causal understanding, offer practical guidance to practitioners, and answer calls for more experimental research in strategy and

organizational research (see Chatterji, Findley, Jensen, Meier, & Nielson, 2016; Eden, 2017). Table 1 provides a summary of the methods and data sources used.

Table 1 Summary of Methods Used and Data Sources

	Chapter 3	Chapter 4	Chapter 5
Focal topic	Distributed decision-making phenomenon	Decision quality of distributed decision-making	Control and shaping of distributed decision-making
Research approach	• Explorative • Inductive	• Theory testing • Deductive	• Theory testing • Deductive
Method	• Qualitative • Multiple-case studies	• Quantitative • Cross-sectional data + Experiment	• Quantitative • Field experiment
Data sources	• Four semi-structured interviews with platform managers of three large firms. • 22 Semi-structured interviews • Archival documents • Survey of platform users, idea creators, and idea evaluators	• Crowdfunding platform (20,405 evaluations) • Expert ratings • Natural language processing of project database	• Crowdfunding platform • Expert ratings • Natural language processing of ideas

1.3 Structure of the Dissertation

The remainder of this dissertation is divided into five parts (overview in Figure 2).

In the next chapter, Chapter 2, I review the literature on distributed decision-making, idea evaluation, and internal crowdfunding to establish the key conceptual foundations for the three studies in this dissertation.

Chapters 3, 4, and 5 make up the central parts of the dissertation. Chapter 3 presents an explorative, qualitative study on internal crowdfunding - a new form of distributed decision-making in organizations. The study shows design principles and trade-offs that affect the functioning of internal crowdfunding. Chapter 4 is an empirical study using field analysis and an experiment to show the effect of hierarchical similarity in distributed decision-making. Chapter 5 is a second quantitative-empirical study and explores how the framing of the distributed decision-making task affects decision outcomes. It tests the hypotheses in a field experiment in a large firm to establish causal understanding and provide valuable recommendations to practitioners.

The dissertation concludes by summarizing and discussing key findings and the contributions from the studies.

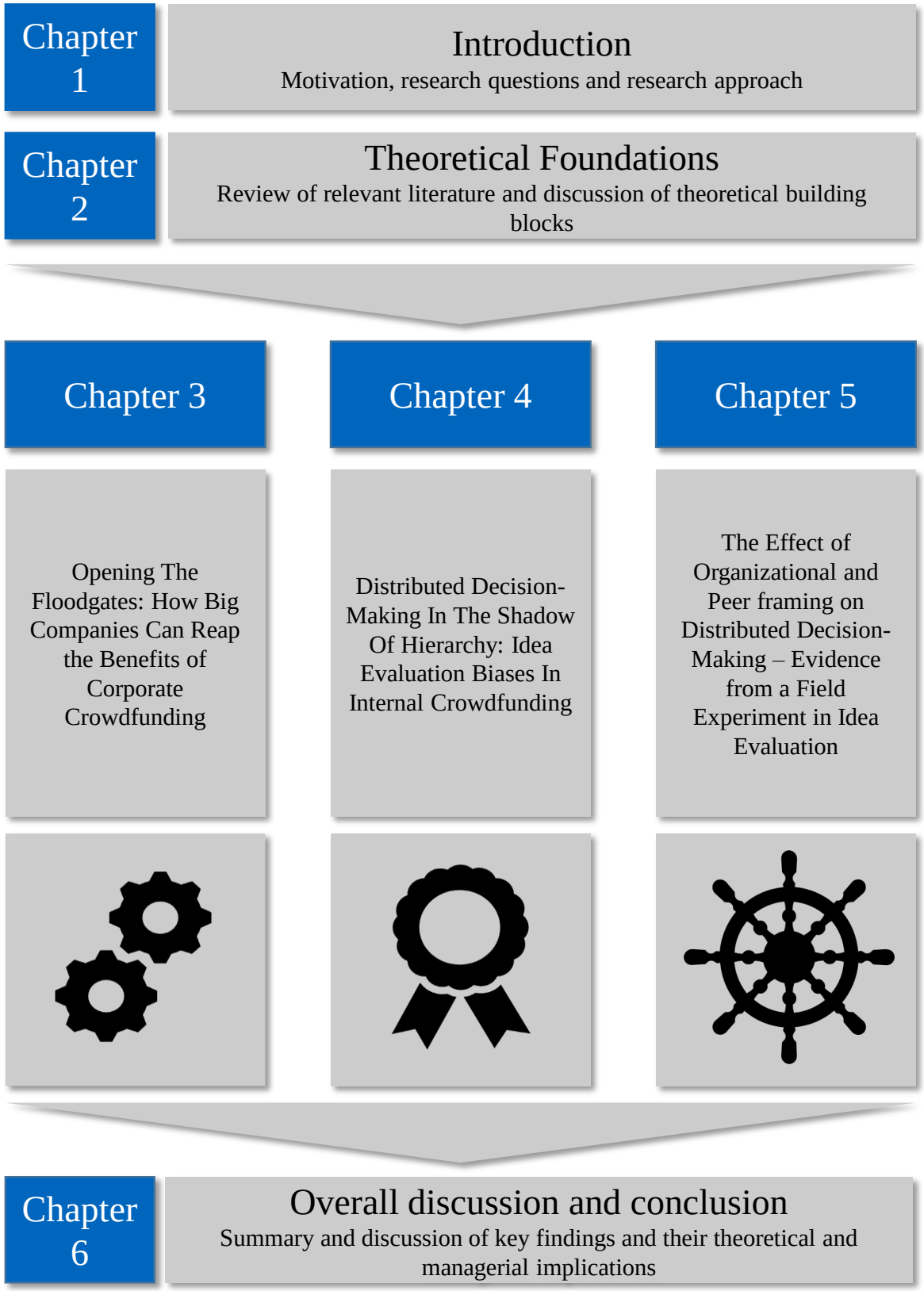

Figure 2 Structure of the Dissertation

2 Theoretical Foundations

In this chapter, I will review the extant research and findings relevant to this dissertation and its research questions. I will provide definitions, discuss the key concepts used in the three studies, and draw from research about distributed decision-making, idea evaluation, and internal crowdfunding. I will especially focus on studies at the intersection of these literature streams. This intersection is promising because of at least three reasons.

First, although idea evaluation is traditionally studied in centralized settings, due to the changes in how organizations make decisions, the idea evaluation literature increasingly focuses on decentralized idea evaluation.

Second, a critical stream in the literature on organizational structures and decision-making is the stream that studies the screening of information in different structures (Joseph & Gaba, 2020). Many of the studies in this stream, which often employ computational models, even explicitly frame their models as idea selection/idea evaluation tasks but seldomly incorporate research from the idea selection/evaluation literature.

Third, while a rich body of research on internal crowdsourcing may already be applicable to certain aspects of internal crowdfunding (i.e., the ideation phase), the idea evaluation aspects offer promising new insights and increasingly also attract scholarly interest within crowdsourcing (see, e.g., Horn, Bogers, & Brem, 2018).

2.1 Distributed Decision-Making

2.1.1 Definition of Distributed Decision-Making

Multiple definitions of decentralized vs. centralized decision-making exist. For example, Mintzberg (1979) writes: "When all the power for decision making rests at a single point in the organization – ultimately in the hands of a single individual – we shall call the structure centralized; to the extent that the power is dispersed among many individuals, we shall call the structure decentralized." (Mintzberg, 1979, p. 181). Furthermore, he distinguishes between horizontal decentralization of power (e.g., to experts) and the vertical decentralization of power, which is referred to as delegation (Mintzberg, 1979).

Research has recently spotlighted that the terms 'distributed' vs. 'decentralized organization' are often used synonymously in organizational research (Vergne, 2020). The author distinguishes: "…decentralization, defined as the dispersion of coordinated communications within organizations, from distribution, defined as the dispersion of organizational decision-making." (Vergne, 2020, p. 2020). Most of the extant research has focused on multi-divisional corporations and the hierarchies therein, where decision-making is distributed so that lower-level employees can allocate resources up to a predefined level, but communication and strategy-making remain centralized (Vergne, 2020). Arguably, new decision-making forms such as internal crowdfunding can be designed distributed (with dispersed decision-making) and decentralized (with dispersed communications and open access to data on the internal platform).

For this dissertation, I regard the forms of decentralized decision-making studied in the three studies as distributed decision-making but draw upon and incorporate research using the terms decentralized and distributed decision-making.

2.1.2 New Forms of Organization and Distributed Decision-Making

Business thinkers and scholars have been increasingly interested in new forms of organization, which enable a change from top-down hierarchies to more decentralized decision-making (Billinger & Workiewicz, 2019; Lee & Edmondson, 2017). Eye-catching titles in practitioner journals like "First let's fire all the managers" (Hamel, 2011) underline this interest in organizational forms where employees have more decision-making authority.

Research has identified various forms of decentralized decision-making such as the "bossless organization" (Foss & Dobrajska, 2015; Puranam & Håkonsson, 2015), "holocracy" (Bernstein, Bunch, Canner, & Lee, 2016), "participatory and inclusive strategizing practices" (Mack & Szulanski, 2017) and analyzed their advantages and disadvantages (e.g., Ketkar & Workiewicz, 2022; Raveendran et al., 2021; Reitzig, 2022).

Scholars have also started to analyze more collaborative organizational forms and increasingly acknowledge that aspects of community mechanisms can be infused into hierarchical forms (see Kolbjørnsrud, 2018). Digital technologies and tools enable companies to open up idea evaluation to employees throughout the company via distributed idea evaluation (Reitzig & Sorenson, 2013), prediction markets (Soukhoroukova et al., 2012), and internal crowdfunding (see Chapter 2.3). Changes in organizational forms and the fact that organizations increasingly employ distributed decision-making processes across ecosystems, platforms, and communities, offer promising new options for research into organizational structure and decision-making (Joseph & Gaba, 2020).

2.1.3 Effects of Decision-Making Structure on Idea Evaluation / Selection

This dissertation aims to contribute to the nascent conversation about biases or errors rooted in the organization of innovation (Colombo et al., 2021; Keum & See, 2017). This conversation tries to uncover biases or errors in centralized, hierarchical, and decentralized decision-making to inform the optimal design of decision-making systems.

Therefore, two streams of research within the distributed decision-making literature are particularly important for this dissertation. The first stream is interested in how decision-making structure influences errors in idea selection. In contrast, the second stream is interested in how organizational structure may aggravate the psychological biases of decision-makers.

In the past, much of the literature on decentralized decision-making focused on the first stream and on how traditional decision-making structures in firms influence errors in idea selection (e.g., Christensen & Knudsen, 2010; Csaszar, 2012; Csaszar & Eggers, 2013; Knudsen & Levinthal, 2007). Unfortunately, it has only recently begun investigating how the organization can use crowds to select ideas.

By employing computational models, research has investigated the optimal size of a crowd for idea selection (Csaszar, 2018). Under the assumption that the crowd uses majority voting, the author finds that the optimal crowd size depends on the ability to attract accurate crowd members. Furthermore, in the computational model, near-optimal performance requires a much smaller crowd than optimal performance (Csaszar, 2018). Csaszar and Eggers (2013) find that in their computational model, an internal crowd can exceed the performance of delegation if it is chosen adequately.

The second stream of research has focused on how organizational structure may aggravate psychological biases (i.e., the systematic errors in decision-makers' estimation Tversky & Kahneman, 1974). Reitzig and Sorenson (2013) investigate how horizontal closeness biases idea evaluation, finding that employees prefer ideas from their own business unit. They find that the in-group bias is less intense if the ideator comes from larger sub-units. Similarly, other research finds that due to fear of negative feedback, lower-level managers pass up fewer ideas in more hierarchical organizational structures (Reitzig & Maciejovsky, 2015). Furthermore, in an experiment and a field study Keum and See (2017) find that a centralized, hierarchical decision-making structure (vs. a decentralized decision-making structure) is more

disadvantageous for idea generation than for idea selection because it reduces the bias of preferring the decision-maker's idea (Fuchs et al., 2019). Besides the seminal exception of Reitzig and Sorenson (2013) and Keum and See (2017), few studies on idea evaluation have investigated biases rooted in attributes of organizational structure.

To properly inform the optimal design of decision-making systems, more research is needed on biases or errors rooted in the organization of innovation (Colombo et al., 2021; Keum & See, 2017). This research is especially needed for modern forms of decentralized decision-making, which firms increasingly adopt.

2.2 Idea Evaluation

How scarce resources (i.e., limited budgets) should be allocated is a crucial decision within practically all organizations (Pfeffer & Salancik, 1974). Furthermore, selecting the best ideas and rejecting the ideas unworthy of further development is also an essential step in the innovation process (Perry-Smith & Mannucci, 2017). Thus, the question is this: what factors affect decision quality in idea evaluation? What factors increase the likelihood that the best ideas will be pursued and the lower-quality ones duly discarded?

A good amount of research has delved into these questions. For example, prior research has investigated how the idea (e.g., Kornish & Ulrich, 2014), the creator (e.g., Fuchs et al., 2019), the evaluator (e.g., Berg, 2016), the creator-evaluator relationship (e.g., Reitzig & Sorenson, 2013 or the context (e.g., Keum & See, 2017) affects idea selection and evaluation (see Zhou, Wang, Bavato, Tasselli, & Wu, 2019 for a comprehensive review). Figure 3 provides an illustration.

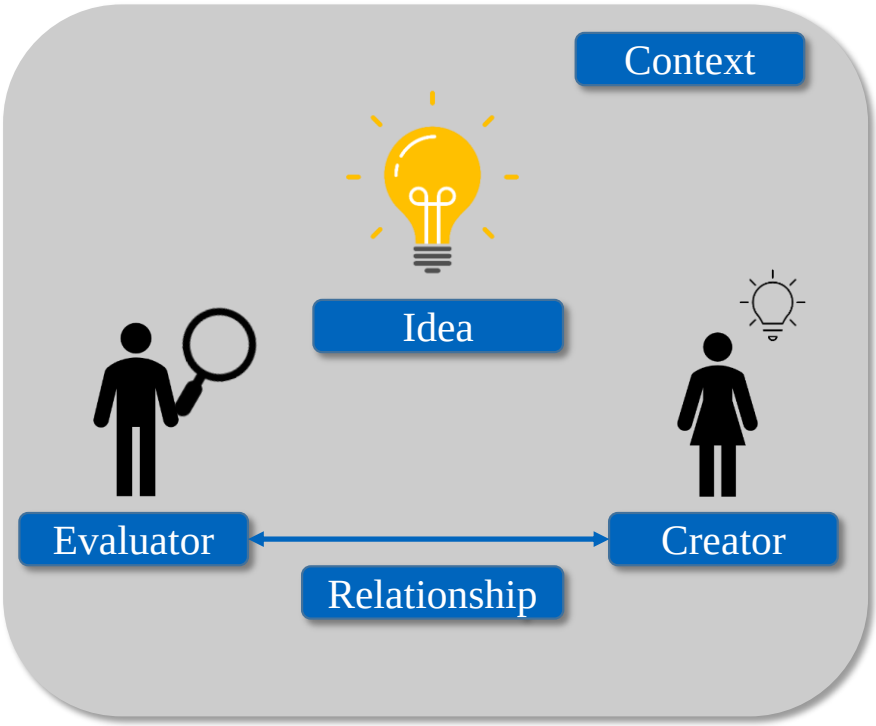

Figure 3 Idea Evaluation Framework

In the following, I will elaborate on the key constructs idea, idea evaluation, and idea selection. Then I will review the literature and the five building blocks of the idea evaluation framework in Figure 3.

2.2.1 Definition of Idea Construct, Idea Evaluation, and Idea Selection

Most of the research relevant for this thesis does not explicitly define the idea construct (see Hua, Harvey, & Rietzschel, 2022 for a systematic investigation across research communities). Hua et al. (2022) propose a new definition: "Ideas are provisional and communicable representations" (Hua et al., 2022, p. 18).

In the domain of innovation research, Sukhov, Magnusson, and Netz (2019) provide an interesting definition for an idea. The authors define an idea as:"… a scenario in a specific context that is deemed unsatisfactory by an actor who explains how this scenario can be improved by applying appropriate resources." (Sukhov et al., 2019, p. 40).

In the review for this dissertation, I will primarily draw from studies implicitly or explicitly using this definition of ideas. Ideas in the sense of this dissertation may be, for example, project pitches, technological ideas, business proposals, artistic proposals, etc. I also reviewed the literature for studies recognizing ideas' emergent and contextual nature (see Hua et al., 2022 for a review).

This dissertation follows other researchers in distinguishing idea evaluation as a cognitive process (e.g., Blair & Mumford, 2007) and conceptualizes idea selection as the outcome of said process.

In innovation studies, many scholars use the terms idea evaluation, idea assessment, idea screening, and idea selection interchangeably. Therefore, in the following literature review, along with the five building blocks of the idea evaluation framework, I also include findings from research using these terms if applicable to the research questions.

2.2.2 Idea Characteristics

Most research in the idea evaluation literature has essentially assumed a gold standard of idea quality, which merely has to be identified by evaluators (Hua et al., 2022). Unfortunately, even if we assume a gold-standard criterion of idea quality, it is difficult to assess an evaluator's accuracy until an idea has been implemented (e.g., Berg, 2016).

Unsurprisingly, evaluators have shown a preference for different aspects of idea quality. Early research found that evaluators prefer ideas that are easy to understand, conform to social standards, and are beneficial to many people, while original, time-intensive, and risky ideas are rejected (Blair & Mumford, 2007). In multiple domains and across a range of ideas, Toubia and Netzer (2017) find that ideas are evaluated as more creative when they balance familiarity and novelty.

Mueller, Melwani, and Goncalo (2012) showed that feelings of uncertainty could lead to an implicit preference for practical ideas over creative (novel and useful) ideas. In a setting where a panel evaluates R&D projects, related research finds that intermediate levels of novelty are preferred, and panels facing a higher workload even decrease their preference for novelty (Criscuolo et al., 2017). Similarly, investors prefer analysts with intermediate levels of novelty in their reports (Giorgi & Weber, 2015).

Besides inherent characteristics such as novelty or familiarity, evaluations of ideas are also influenced by the presentation of an idea to different audiences (Falchetti, Cattani, & Ferriani, 2021; Lu, Bartol, Venkataramani, Zheng, & Liu, 2019). For instance, experimental findings suggest that idea creators should frame their novel ideas according to the target audience's level of mental construal. It finds that novices prefer abstract (why) framings, while experts prefer concrete how terms (Falchetti et al., 2021). Since novel ideas differ more from existing solutions than more conventional ideas, their value is harder to assess. Evaluating novel

ideas may need new frames of reference, creating uncertainties that make idea evaluation particularly prone to biases (Criscuolo et al., 2017; Tversky & Kahneman, 1974).

Even in light of the above-mentioned important studies, there is a need for more research investigating the interplay between previously known biases and novelty in general and in distributed decision-making specifically. Chapter 4 tries to fill this gap by extending current research investigating this interplay between structural biases and novelty (see Criscuolo et al., 2017).

2.2.3 Creator Characteristics

A range of creator characteristics potentially biases the evaluation of new ideas and products (see Zhou et al., 2019). For example, investors and nonprofessional evaluators revealed a preference for male entrepreneurs over female entrepreneurs in pitch competitions and experiments, although the content of the pitch was the same (Brooks, Huang, Kearney, & Murray, 2014). Closer to the distributed decision-making systems studied in this dissertation, in a web-enabled ideation system of distributed employees, ideas with contributors from different functions were selected with a higher likelihood. In contrast, diversity in geographic location did not significantly affect the selection (Beretta, 2019).

Idea evaluation research has only begun to examine the influence of creator characteristics. The increasing use of distributed decision-making and web-enabled ideation platforms enabling increased collaboration from different functions, geographic regions, and hierarchies stresses the importance of research on the influence of other creator characteristics on idea evaluation.

2.2.4 Evaluator Characteristics

Research in innovation and idea evaluation has been especially focused on how different types of audiences evaluate ideas differently. Creativity is always interpreted in the eye of the beholder, and each audience uses different idea evaluation criteria. Studies have investigated, for example, experts (Sukhov, Sihvonen, Netz, Magnusson, & Olsson, 2021), managers vs. creators (Berg, 2016), decision-makers (Mueller, Melwani, Loewenstein, & Deal, 2018), decision-makers in panels (Criscuolo, Dahlander, Grohsjean, & Salter, 2021), consumers (Moreau, Lehmann, & Markman, 2001), lead-users (Ozer, 2009) and technically skilled vs. naïve users (Magnusson, Wästlund, & Netz, 2016).

In the circus arts industry, Berg (2016) found that idea creators were more accurate at estimating the success of novel ideas than managers or laypeople. Consistent with others (e.g., Fuchs et al., 2019), he finds that creators overvalue their own ideas. Evaluators who have also created and contributed ideas themselves evaluate others' ideas worse than evaluators who have not created ideas (Schweisfurth & Füller, 2020).

In distributed idea screening, Onarheim and Christensen (2012) find a similar bias at the individual level but note that it vanished when aggregating across employees. They also find considerable overlap in evaluation outcomes between the group of employees and executives.

Research also finds that the role of the decision-maker may evoke mindsets, which negatively influence creativity assessment. Specifically, decision-makers in an economic mindset seem to reject creative ideas with little social acknowledgment. However, low social approval did not affect perceptions of usefulness (Mueller et al., 2018). Interestingly, in their experiment, the researchers manipulated the decision-maker role by telling participants that either their assessment would be the final word (treatment) or that the assessment would be added to other assessments, and then the collective decision would matter (control). This control group treatment is similar to many settings of distributed decision-making systems, where

employee assessments are aggregated. Intriguing results like these underline the need for increased knowledge about how these systems shape creativity or novelty perceptions.

Increasingly, research has taken a closer look at how domain knowledge or expertise influences idea evaluation. For instance, scientists discount others' proposals that are thematically close to their own work and prefer moderate levels of novelty (Boudreau et al., 2016). In a corporate setting, Mount, Baer, and Lupoli (2021) find that decision-makers whose domain expertise is far removed from a highly novel technological idea are less likely to invest in it. This negative effect can be decreased by adopting a low-level construal (i.e., a concrete how-framing) due to the decreased perceptions of novelty and increased perceptions of usefulness (Mount et al., 2021).

Another stream of the literature has investigated different evaluator thinking styles (intuitive vs. rational/formal), which can be used in distributed decision-making (e.g., Dziallas, 2020; Eling, Langerak, & Griffin, 2015; Magnusson, Netz, & Wästlund, 2014). On the one hand, it showed that the speed and the quality of evaluation of ideas were increased if intuition and rational analysis were combined (Eling et al., 2015). On the other hand, rational thinking is less likely to lead to escalated commitment than evaluation by intuition (Eling, Griffin, & Langerak, 2016). In order to work, intuitive thinking for idea evaluation requires the involvement of decision-makers with the proper expertise (Magnusson, Netz, 2014).

In summary, it is unclear how evaluator characteristics such as their role in the organization, domain of expertise, and thinking style influence idea evaluation in distributed decision-making. As described above, even organizational design elements intended to increase organizational performance, such as the decision-maker role, are known to lead to the rejection of creative ideas under certain conditions (Mueller et al., 2018). This raises the critical question of how organizations can shape idea evaluation toward the preferred outcomes. Chapter 5

examines framing as a potential instrument for managerial control of distributed idea evaluation and its effects on quantity and quality (e.g., the novelty of selected ideas).

2.2.5 Creator-Evaluator Relationship

Evaluators also consider their relationship to the creator when evaluating ideas. For instance, research on crowdfunding shows that crowdfunders prefer if they have a shared social identity with the creators, i.e., if they belong to the same group (Greenberg & Mollick, 2017). Furthermore, venture capitalists are more likely to select startups if they share ethnicity (Hegde & Tumlinson, 2014), experience (Franke, Gruber, Harhoff, & Henkel, 2006), and social ties with their team members.

Within idea evaluation research, Reitzig and Sorenson (2013) investigate how lateral closeness biases idea evaluation, finding that employees prefer ideas from their own business unit. Research on other forms of creator-evaluator relationships, such as vertical creator-evaluator relationships, ubiquitous in organizations, is scarce so far. In this regard, idea evaluation in distributed decision-making offers exciting research opportunities for upward and peer evaluation, along with downward evaluation. Research in this field could answer recent calls for research into the "dynamics of simultaneous upward and downward influences" (Weiser et al., 2020, p. 990). Chapter 4 tries to contribute to this literature by showing how and why hierarchical similarity distorts distributed idea evaluation.

2.2.6 Idea Evaluation Context

Previous studies have investigated how idea evaluation is influenced by the context (i.e., the circumstances in which the decision-making task is performed). For instance, the order of ideas in idea evaluations affects the accuracy of idea evaluations (Elhorst & Faems, 2021). Furthermore, the temporal sequence of decisions influences idea selection in panels. In the setting the researchers studied, an idea received 23 percent less than the requested funds if the previous idea was funded (Criscuolo et al., 2021).

Others have also studied how different cultures lead to different creativity assessments (Loewenstein & Mueller, 2016). The methods used for idea evaluation (e.g., Blohm, Riedl, Füller, & Leimeister, 2016; Klein & Garcia, 2015) are increasingly attracting more attention from scholars. Chapter 3 will explore a new method for distributed idea evaluation – internal crowdfunding.

To my knowledge, the framing of the idea evaluation task has not been investigated so far. This is surprising, as most methods for idea evaluation at some point need to specify the idea evaluation task. For example, consider a scientific funding agency that specifies the evaluation criteria to its reviewers or a firm that instructs its employees to rate crowdsourced ideas with a rating scale. Chapter 5 will investigate the framing of the idea evaluation task as an influencing factor for idea evaluation.

2.3 Internal Crowdfunding – A Tool for Distributed Decision-Making

Following a trend toward democratizing innovation (Hippel, 2006) and inspired by the benefits of internal crowdsourcing (Bayus, 2013), firms such as Audi, Daimler, IBM, Kühne+Nagel, Lufthansa Systems, and Siemens have started to adopt a new form of distributed idea evaluation – *internal crowdfunding (see also Feldmann et al., 2014; Feldmann & Gimpel, 2016; Muller et al., 2013)*. Through internal crowdfunding, firms now can crowdsource the task of decision-making in project selection to an inner crowd instead of asking managers, the group of employees that traditionally evaluates and selects ideas (see Zuchowski et al., 2016).

In the following, I will briefly elaborate on the definition of internal crowdfunding, which this dissertation draws upon. Then I will review the current literature on crowdfunding and outline underexplored topics.

2.3.1 Definition of Internal Crowdfunding

Whereas research on crowdsourcing and internal crowdsourcing increasingly attracts attention, research on internal or enterprise crowdfunding is still emerging (Zuchowski et al., 2016). Simons et al. (2019) synthesize current research on enterprise crowdfunding and distinguish two forms: internal and external crowdfunding. They contend that external crowdfunding includes the solicitation of the public, while internal crowdfunding involves a crowd of employees and an internal platform. They characterize internal crowdfunding as:

"*…primarily used to foster innovation and collaboration among employees, who propose and evaluate project ideas on Intranet platforms by allocating company money.*" (Simons et al., 2019, p. 118)

Following their definition, this dissertation focuses on internal crowdfunding. Specifically, it focuses on the aspects of distributed decision-making that internal crowdfunding enables.

Much of the literature has investigated crowdfunding initiatives at firms that pioneered internal crowdfunding (for research on external enterprise crowdfunding, see Simons et al., 2019 and Jovanovic, Bansemir, Kirchner, & Voigt, 2017). The most prominent and most studied example is IBM's internal crowdfunding initiative, which has shaped much of the conceptualization of internal crowdfunding. Furthermore, the descriptions of the IBM case have also coined much of the terminology. Unsurprisingly, this has led to calls for further research about design principles and the use of internal crowdfunding in other companies (e.g., Simons et al., 2019).

2.3.2 Current Research on Internal Crowdfunding

I will review current research and findings on internal crowdfunding in the following. Multiple studies investigate internal crowdfunding initiatives at IBM. Muller et al. (2013) describe the first internal crowdfunding initiative and, for example, emphasize its high participation rate across hierarchy and organizational structure. They also report significant inter-departmental funding and valuable employee proposals.

Furthermore, in the context of a second internal crowdfunding initiative and building on homophily and social identity theory, they find that shared attributes increase the tendency to invest in an idea on the platform (e.g., coming from the same country, same working group, same division) (Muller, Geyer, Soule, & Wafer, 2014).

Investigating the timing of decisions in the crowdfunding platform at IBM, Feldmann et al. (2014) find that evaluators take their decisions quickly, with around 68 percent of decisions taken after one view of the idea description.

The effect of idea characteristics on funding success has also been studied. Specifically, Feldmann and Gimpel (2016) report that idea elaboration significantly influenced funding success, whereas other idea quality characteristics (e.g., novelty, relevance, and feasibility) showed no significant influence.

Another study showed that the social ties of idea creators increased the likelihood of funding success. For example, ideas that were co-created by multiple idea creators were more successful than ideas with fewer or single idea creators (Muller et al., 2016). Employees also self-selected into different roles within IBM's crowdfunding initiative depending on their network size (e.g., leaders of the creator team had more extensive social networks) and subsequently grew their networks to different degrees (Muller, Mitra, & Geyer, 2018).

More recently, research has also begun to investigate the effects of internal crowdfunding on employee engagement. In an undisclosed multinational manufacturing and electronics firm, Benz (2022) found significantly increased levels of behavioral engagement after participation in internal crowdfunding but found no significant increase in state engagement. Comparing rating scales and internal crowdfunding mechanisms in an experimental setting, Benz, Zierau, and Satzger (2019) found no direct effect between the representation of the task and user engagement. Still, they found that internal crowdfunding may be perceived as more cognitive taxing, which leads to users feeling less engaged.

In summary, while research on the topic is emerging and promising, various exciting questions for research remain. As seen in the short review above, the overall dominance of studies focusing on the IBM case is significant. To strengthen the conceptual foundations of the emerging research on internal crowdfunding, Chapter 3 investigates three different cases of internal crowdfunding (Siemens, Lufthansa, Kühne + Nagle). By exploring the organization of internal crowdfunding and the design elements in different contexts, we hope to address calls for further research on design principles and the use of internal crowdfunding in other companies (e.g., Simons et al., 2019).

Research has only begun to identify promising benefits of internal crowdfunding, such as high levels of participation and cross-departmental cooperation (Muller, 2013), valuable proposals (Muller et al., 2013), quick decisions (Feldmann et al., 2014), employee network

growth (Muller et al., 2018) and employee engagement (Benz, 2022). Chapter 3 also hopes to contribute to this emergent research on the benefits and challenges of internal crowdfunding.

Other findings point to potential challenges such as higher success rates for creators who share attributes with evaluators (Muller et al., 2014) or have more extensive networks (Muller et al., 2016). Considering firms' increasing adoption of internal crowdfunding, a better understanding of how internal crowdfunding platforms must be designed to effectively leverage the wisdom of internal crowds for distributed decision-making is needed. Therefore, Chapter 4 and Chapter 5 study distributed decision-making in the context of internal crowdfunding initiatives.

3 Opening the Floodgates: How Big Companies Can Reap the Benefits of Internal Crowdfunding

3.1 Abstract

Digital technologies enable employees at all levels to participate in distributed decision-making. We examine the design principles, benefits, and challenges of a new form of distributed decision-making – internal crowdfunding. We build on a five-year study of internal crowdfunding contests at Siemens and additional interviews with managers in charge of internal crowdfunding at Lufthansa Systems, Kühne+Nagel to answer calls for further theorizing about the design principles of internal crowdfunding and its adoption across firms. We find four important benefits (decentralization, cross-collaboration, institutionalization, and intrapreneurship), discuss the three Cs of internal crowdfunding (contributors, configuration, control), and identify three key challenges (dealing with rejected ideas, evaluation biases, and implementation and follow-on funding) and potential actions from managers to overcome them. We contribute to the emergent literature on internal crowdfunding and the literature on distributed decision-making.

3.2 Introduction

Traditionally, top managers are the ones who select important projects, allocate funds, and make budget decisions (Colombo et al., 2021; Keum & See, 2017). However, enabled by digital transformation, organizations are increasingly involving their employees more broadly to find and implement the next big idea. Companies such as IBM, Daimler, Lufthansa Systems, Kühne+Nagel, Audi, and Siemens have been adapting external crowdfunding methods and applying them internally in the form of *internal crowdfunding* (see also Feldmann et al., 2014; Feldmann & Gimpel, 2016; Muller et al., 2013) Through this new method, a range of cutting-edge ideas on various and visionary topics such as offshore seaweed farming, drones for the inspection of wind turbines, and intelligent chatbots for new job applicants have been developed and subsequently transformed into prototypes or products.

Internal crowdfunding transfers external crowdfunding principles into organizations: Employees share ideas and a budget goal for implementation, while other employees fund (or do not fund) these ideas with slices of the corporate budget (see, e.g., Feldmann & Gimpel, 2016; Muller et al., 2013). Internal crowdfunding allows employees to seek internal support for their projects, tap into new budgets outside their unit, and foster intrapreneurship in the company. While external crowdfunding via Kickstarter, Indiegogo, or Crowdfunder has become a 'vanilla' tool for startups and ventures to obtain funding for and feedback to their ideas, internal crowdfunding is fairly new in the corporate toolbox.

To learn more about internal crowdfunding, we conducted a five-year study of nine consecutive contests within Siemens. Siemens is Europe's largest industrial manufacturing company; its crowdfunding program has been recognized by the American business magazine FastCompany and won the International Society for Professional Innovation Management (ISPIM) Grand Prize. We provided help during the design of contests, observed participants, conducted experiments, and interviewed participants and decision-makers. One of the authors

was the initiator of the crowdfunding program at Siemens and oversaw all its crowdfunding campaigns (See "About the Research"). We also conducted interviews with other firms employing internal crowdfunding tools (e.g., Lufthansa Systems and Kühne+Nagel).

This article introduces internal crowdfunding as a decision-making tool for collaboration, bottom-up strategizing, and innovation in firms. We present design elements of internal crowdfunding, which can help managers to build internal crowdfunding initiatives successfully. We explore the benefits and problems associated with internal crowdfunding and identify actions that help address the identified challenges.

3.3 How Does Internal Crowdfunding Work?

In the initial phase of a typical internal crowdfunding campaign, the *ideation phase*, employees develop ideas or projects they wish to realize and present their ideas on an internal platform. The proposals include a description of the idea, its value to the firm, the requested budget, and a timeline for implementation (see Feldmann & Gimpel, 2016 for a description of design elements at IBM). Coworkers can provide comments, criticism, help, and guidance. This phase often involves high employee participation: In peak times, up to 30% of Lufthansa Systems' employees were monthly active users of its internal crowdfunding platform.

In the next phase, *funding*, employees throughout the company can apply to receive a personal budget to invest in others' ideas, i.e., they take the role of funders or investors. At Siemens, the number of investor positions (and thus the allocated corporate funding budget) is specified before each campaign. Usually, slots are heavily oversubscribed, so a lottery decides who will become an investor. Of course, all employees worldwide can comment, 'like' ideas, and discuss on the platform.

If an idea gets the requested funds, it proceeds to the *implementation phase*, often without further management approval being required. Here, project owners realize the projects and inform internal investors and other participants about their projects' progress.

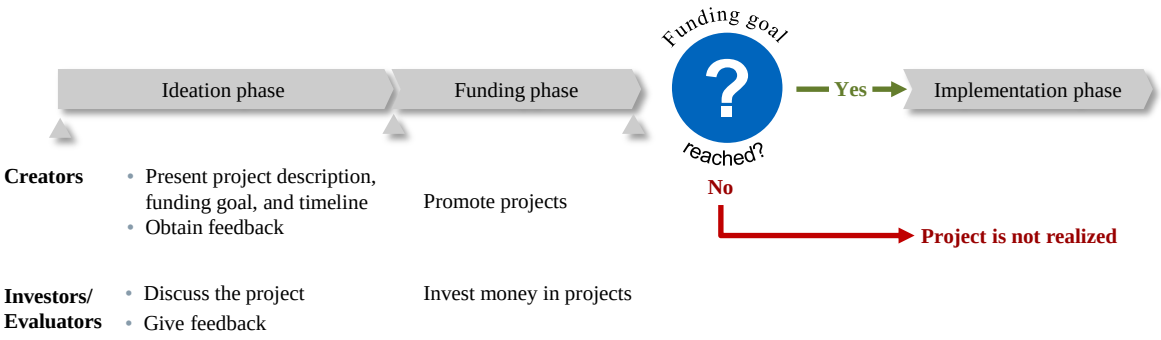

Figure 4 Internal Crowdfunding Process at Siemens

3.4 What Are the Benefits of Internal Crowdfunding?

We asked managers in charge of internal crowdfunding campaigns at various companies about the benefits of internal crowdfunding compared to traditional innovation processes. They identified four key benefits: decentralization, cross-collaboration, institutionalization, and intrapreneurship.

Decentralization	Cross-collaboration	Institutionalization	Intrapreneurship
Internal crowdfunding...	Internal crowdfunding....	Internal crowdfunding....	Internal crowdfunding...
• taps new sources for generating 'outside-the-box' ideas • accelerates solution development while reducing expenses on bad ideas through early-stage, broad feedback • counteracts myopia and path dependancy in idea evaluation	• leverages diverse employee talents and experience • facilitates shared development and evolution of solutions on the platform • kick-starts new working relationships across departments, functions, hierarchies, thus breaking up silos	• creates transparency, giving bootlegged projects a stage • draws broad attention to potentially disruptive and blind-spot ideas, which are otherwise reported to immediate supervisors only • provides short-cut through organizational barriers for ideas outside the goals of immediate supervisor/department/ function	• increases motivation of idea champions for implementation • enriches skillset from R&D employee to intrapreneur • produces prototypes early on and collects feedback

Figure 5 Benefits of Internal Crowdfunding

Decentralization. Internal crowdfunding provides a tool to *match ideas, capabilities, and budgets decentrally* on one platform. Specifically, it allows employees from across the organization to take part in idea creation and evaluation:

In the ideation phase, internal crowdfunding picks up new trends, weak signals, and employees' ideas, helping organizations leverage their employees' talents and experience.

Hidden ideas emerge that are grounded in context-specific expert knowledge. Opening these floodgates of innovation often invites an abundance of diverse ideas. For instance, Siemens collected approximately 120 ideas per contest. These ranged from simple but powerful ideas like 'blind' lunch dates depending on preferred locations, times, and interests (more than 20,000 employees have already used this grassroots tool) over 3D-printed camera cases for gas turbine inspection to intelligent railway axles.

In the funding phase, internal crowdfunding not only helps to distribute the evaluation effort across many shoulders; it also makes the idea evaluation more transparent and democratic. Internal crowdfunding allows companies to integrate evaluations by employees from all different levels. One primary advantage of such an approach is that an entire crowd of employees can evaluate ideas, bringing unique experiences and skills to the table. Based on their backgrounds, employees will have different perspectives on ideas, mitigating myopia and path-dependency in idea selection. For example, internal crowdfunding investors were among the first supporters of the idea to establish the Siemens AI Lab, which today is spearheading Siemens' industrial artificial intelligence efforts.

Cross-collaboration. Internal crowdfunding helps organizations learn by bridging knowledge fields and kick-starting collaborations among otherwise distant employees. Employees from different departments, hierarchies, and functions jointly contribute ideas, comment on, refine, and co-develop solutions. Single ideators can "meet" yet unknown employees with complementary knowledge and experience and thus form new project teams. Conversely, investors can indicate their interest in participating in a project. At Lufthansa Systems, it is easy to initiate new collaborations because employees just need to click on the *participate* button if they wish to become part of a project.

This benefit is exemplified by a Siemens team working on an idea about offshore seaweed farming. It consisted of employees from four countries as well as different hierarchies

and functions. They would not have met in their daily jobs, although they share the same strong interest in sustainable solutions. Another intriguing example is Audi's crowdfunding initiative. The proposal to build the small robot ADUI, an HR chatbot for communication with young professionals during the hiring process, included more than 20 departments (Audi, 2019).

Cross-boundary collaboration is also valued by participating employees: More than 62% of the idea creators we surveyed at Siemens stated that they uploaded an idea because they wanted to collaborate with colleagues from other departments. They indicated that building their knowledge about other colleagues' activities was a key benefit of internal crowdfunding.

Institutionalization. The investors, managers, and users of our case companies' internal crowdfunding platforms described the ideas as novel and unique compared to the ideas that usually float around their company. The internal crowdfunding platform creates unprecedented transparency by offering a stage for skunkworks. Usually, ideas are reported to immediate supervisors only if they fit their department's specific goals. The internal crowdfunding campaign can be a shortcut through organizational barriers for ideas that benefit an organization as a whole, or a different part of the organization.

An example of discovering a valuable blind-spot idea at Siemens relates to a team of creators working on improving nondestructive testing methods. They proposed building a prototype to inspect wind turbines with nondestructive testing technology on drones outside their department's current technical focus, but potentially valuable for the Siemens wind turbine unit.

Intrapreneurship. The case firms' participants in internal crowdfunding were intrinsically motivated and champions of their ideas. They felt empowered by having a real opportunity to develop their ideas into solutions and acquired new intrapreneurial skills on the way: They created persuasive pitches for their ideas, led cross-functional teams, built

professional networks outside their departments, and treated their project as a venture within the firm.

Internal crowdfunding makes the innovation process more intrapreneurial. Early feedback in the ideation phase helps idea owners to accelerate the development of practical solutions and weed out bad or redundant ideas early on. The case firms' managers stated that, compared to the traditional process, internal crowdfunding accelerates the decision process from an idea to its implementation. Intrapreneurs can test the viability of specific ideas early on – the outcome of many ideas is a minimum viable product in the form of a tangible prototype. In one case, an engineer proposed a new design of a beacon platform for a central location and could prove its technical viability in a prototype. After this success, management decided to fund the general rollout of the technology within Siemens. Similarly swiftly, functional extensions of Kühne+Nagel's internal crowdfunding platform were developed by its users (and financed through investors on the platform).

3.5 How to Design an Internal Crowdfunding Campaign: The Three Cs of Internal Crowdfunding

When designing an internal crowdfunding campaign, managers must deal with three topic areas: contributors (which crowds to attract and how to keep the contributors motivated?), platform configuration (how to configure the platform?), and control (how much control to retain over outcomes?). We organized our discussion around these three key questions.

Which crowds to attract and how to keep the contributors motivated?

How many people should be involved?

- Many vs. few

Who should evaluate?

- All vs. selected group

How do you want to motivate participants?

- Rewards vs. other forms of recognition

How to configure the crowdfunding platform?

How frequently do you want to conduct your initiative?

- Continuous endeavor or tournament style

How many funding steps?

- More work packages allowed or single-level idea

How transparent do you want the platform to be?

- Anonymous or identified evaluators

How much control to retain over the outcomes?

How do you want to control idea input?

- Open vs. closed 'call for ideas'
- Vetting of ideas or open input

How do you want to control output?

- Veto right for management or no veto right

Figure 6 Three Cs of Internal Crowdfunding

Contributors - Which crowds to attract and how to keep the contributors motivated? A key determinant of success is the participating crowd's size and composition. When deciding how many and which participants at their firm should be invited, managers need to balance the expertise of a small, knowledgeable crowd in a specific domain and the diversity and heterogeneous knowledge that comes with greater openness.

Four groups determine the success of internal crowdfunding campaigns: idea creators, investors, commenters, and lurkers. While an internal crowdfunding platform should be open to comments, likes, or lurking from employees at large, it may be beneficial to set lower and upper bounds for the size of the potential idea creators. Of course, in principle, internal crowdfunding can work with very few creative participants.

In our experience, around 500-1000 invited participants propose ideas in a sufficient number. The dangers of making a campaign too narrow are constant struggles to rally potential participants and bring in ideas. In contrast, making it too broad renders a crowdfunding campaign unmanageable. Thus it makes sense to limit the maximum number of potential participants. At Siemens, around 3000 invited participants regularly proposed around 150-200 ideas – a number still sufficiently small to screen through for investors.

Another important decision is the choice of investors. While the decision to include a particular selection of investors is sometimes warranted, in most of the case companies' internal crowdfunding contests, the choice to become an investor was available to everyone. If a limited amount of investor positions were available, investors were chosen randomly. A noteworthy exception was Kühne+Nagel's approach – here, every employee responsible for a cost center budget could invest funds from their regular budget.

To motivate the participants, a manager in charge of designing an internal crowdfunding campaign must think about multiple incentives available to motivate the three groups: ideators, investors, and commenters.

With regard to ideator motivation, managers need to decide whether to reward only exceptional submissions or to reward more employees for their engagement. Monetary incentives such as prizes or even a share of the revenue of implemented ideas could be strong motivating factors, but so far, no internal crowdfunding contest we studied provided employees with pecuniary incentives. Instead, participating employees were motivated by potentially getting the budget for implementation, by getting visibility of their ideas, and by managerial attention.

Investors were motivated by the empowerment to decide about the R&D budget, the positive feeling of sharing their competencies, and by learning about innovative ideas. In addition, managers in charge of internal crowdfunding should facilitate learning opportunities

for investors. They could do so by having regular investor briefings after each internal crowdfunding campaign or showing the investors' records of accomplishment. Since the second campaign in 2015 – when the internal crowdfunding program became more known throughout Siemens – the number of investor applications always exceeded the available positions considerably, and no financial incentives were needed.

For commentors, Siemens started their crowdfunding competitions by handing out iPads for the best comments. This approach was abandoned after the first campaign at Siemens. Instead, the campaign team began to nominate special moderators with large networks to forward ideas to potential experts to spark the conversation. If made aware of certain ideas, experts did not need special incentives to comment and share knowledge.

Configuration - How to configure the crowdfunding platform? Here, managers must consider three key dimensions: the timeframe, the funding mechanism, and platform transparency.

The internal crowdfunding campaigns at the case firms have either been conducted as recurring tournaments with a limited timeframe (Siemens, Kühne+Nagel) or continual endeavors (Lufthansa Systems). In a continual approach, the budget that each investor receives must be refilled from time to time. For instance, Lufthansa Systems' continual approach awarded each investor a starting budget of €1,000 and an additional €85 a month. In a tournament, the total budget is fixed. At Siemens, the campaigns usually lasted around six weeks, and each investor received around €3,000 to invest freely into ideas.

If an idea on the platform receives the funds required for its implementation, it proceeds to the implementation phase. If an idea does not reach its minimum budget goal, it receives no budget at all and will not be implemented (all-or-nothing principle). To facilitate different maturity levels, it makes sense to allow the introduction of work package goals. For instance, an experienced idea creator could propose an idea in which, for $3,000 the conceptual planning

is completed, for $5,000 market testing is feasible, and for $10,000 a prototype can be built. Siemens tested both single-level and multi-level campaigns. The latter naturally results in more funded (partial) projects, since the barrier is lower, giving more ideators opportunities to get seed funding; however, these projects typically become smaller in scope, than when more budget is available.

Different transparency regimes can be chosen depending on the different legal requirements concerning labor laws and key innovation goals (e.g., fostering employee engagement or enabling cross-collaboration). In countries with strict labor laws, it may be a legal requirement to hide individual investments and to grant investor anonymity. Managers may also choose to reveal idea creators' identities only after the investment period is completed to prevent personal signaling effects from distorting investment decisions (see "About the Research").

How did our case companies deal with transparency? At Siemens, anonymous idea submission was possible, yet not one ideator selected this option. For a commenter, it was mandatory to reveal their real name to create an atmosphere of trust and openness. Investor identities were not public at any stage to prevent putting people under pressure to fund a specific project. Lufthansa Systems chose a similar set-up. By contrast, Kühne+Nagel deliberately chose to reveal investor identities to show that big names in the organization endorsed particular ideas and were willing to risk their budget and reputation by investing in them.

Control - How much control to retain over outcomes? Internal crowdfunding can democratize innovation. To do so, managers have to trust their employees' wisdom. Depending on how much control they wish to retain, they have to consider two important areas: control of idea input and output control.

Concerning a campaign's specific topic area, there are different approaches. A call for particular ideas in a specific domain can be broadcast, or a campaign could be open to all ideas.

The latter benefits from allowing disruptive and 'out-of-the-box' ideas with a higher potential of failing. At Siemens, all Quickstarter rounds at the central technology departments were open to any ideas, while three crowdfunding campaigns in business units had a more focused setup. In contrast, Lufthansa Systems chose a different path, inviting all its employees to solve technology-, customer-, or trend-oriented challenges.

Although it is possible to vet incoming ideas and decide upfront which should be visible for evaluation in the funding phase, in our view, it is advantageous to open up the platform to all ideas. This approach signals trust in employees, which was mentioned as an important motivating factor by interviewed participants.

Years of practice in our case firms also showed that it is not necessary to grant managers a veto right to prevent ideas that may be detrimental to the firm's goals from being funded. In the vast majority of cases, the crowd chose projects that were beneficial to the companies. Notably, we saw at Siemens that some of the most popular ideas were not funded. A thorough analysis of the comments showed that although these ideas were socially desirable (e.g., an app to deliver home-cooked meals in India), they did not fit the corporate portfolio; and investors took this into account.

Initial concerns about a lack of fit mainly were overstated. For instance, managers at Siemens had asked what would happen if employees funded a beer garden with their crowdfunding budget. Yet, these concerns never came into play – instead, the least business-relevant idea funded in the first round was an internal child care program during vacation time, which was so successful that the HR department took it over.

Too much control early on in the process by vetoing or vetting ideas may undermine employee engagement and participants' motivation (see "What Are the Benefits of Internal Crowdfunding"). In our experience, control does come into play at a later stage. The ideas

prototyped through internal crowdfunding require additional management decisions, follow-on funding, and an interface to the firm's usual innovation process, with more control options.

3.6 Challenges in Internal Crowdfunding and How to Overcome Them

As helpful as internal crowdfunding can be, it also comes with several challenges. Our research led us to identify three key challenges and potential actions from managers to overcome them. These are: dealing with rejected ideas, evaluation biases, and implementation and follow-on funding.

Dealing with rejected ideas. To uphold the motivation of ideators, firms must deal with ideas that did not receive the desired funding. Siemens offered special coaching for any project that did not reach its funding goal, which some ideators happily accepted. Besides, the Siemens Technology Accelerator, whose mission is to build new businesses with cutting-edge Siemens technologies, looked at all failed projects and picked some for their own program.

The managers we talked to were convinced that a key to upholding motivation was to communicate the reasons why an idea was rejected. Emphasizing that the value of ideas may also depend on time and context, Lufthansa Systems stressed that rejected ideas could easily be submitted again for funding.

Evaluation biases. The decentralized nature of decision-making may introduce new biases. For instance, we found that investors favored ideas from idea creators from similar hierarchical levels, with whom they share a social identity – as long as they are not competitors. Also, like in external crowdfunding, herding effects can occur when investors wait for signals and then 'follow the crowd' instead of revealing their true preferences. At the same time, biases are not unique to internal crowdfunding. In fact, it is particularly due to the biases of traditional decision-making that internal crowdfunding is gaining traction.

Remedies depend on the specific case. E.g., suppose managers believe that their firm's crowd is highly susceptible to herding behavior. In that case, one could reveal the funding status of each idea only at the end of the funding phase, thus preventing herding.

Implementation and follow-on funding. Internal crowdfunding provides seed funding for early-stage ideas. In this embryonic stage, ideas and projects are often out in the wild, on their own, especially after crowdfunding funds have run out. These ideas are easy to kill, because they have not followed the standard process, which managers often associate with a lack of fit with the firm's structures and processes. There must be a clear exploitation strategy of what happens to ideas after the initial funding has run out, to protect internal crowdfunding ideas. Will they be handed over to a business unit, sold, accelerated, or funded by another fund?

Lufthansa Systems, for instance, chose a continual handover of successful ideas for further screening and funding, either to the respective business unit or to the Lufthansa Innovation Fund.

Conclusion. In net, while internal crowdfunding must be actively managed to overcome roadblocks that can emerge at different points in the process, it may be well worth the investment, since the benefits for innovation, collaboration, and employee engagement are significant.

3.7 About the Research

The article builds on our five-year study of internal crowdfunding contests in Siemens, Europe's largest industrial manufacturing company. Siemens started working with internal crowdfunding in 2015 and has carried out nine rounds, with a total volume of €4.0 million. This initiative at Siemens received the 2018 ISPIM Grand Prize from the International Society for Professional Innovation Management (ISPIM). One of the authors was the initiator of the crowdfunding program "Quickstarter" at Siemens and oversaw the implementation. Thus, the research team had access to all relevant documents, the internal campaign databases, and the team responsible for coordinating internal crowdfunding at Siemens. Further, we conducted interviews with managers in charge of internal crowdfunding at Lufthansa Systems and Kühne+Nagel.

Specifically, we built our conclusions on the following data sources:

- A comprehensive quantitative analysis of a crowdfunding campaign that encompassed 77 ideas, which were evaluated by 265 employees and yielded more than 20,405 evaluation decisions. Each employee was granted a personal budget of €3,160, which accumulated to a total budget of around €837,000 (see Chapter 4)
- A field experiment in which all 343 employee investors of a recent crowdfunding campaign were randomly allocated to three experimental conditions to study how different frames influence investor behaviors (see Chapter 5)
- Direct and observational experience of all crowdfunding campaigns conducted to date within Siemens.
- 22 interviews and a survey with Siemens employees, including interviews with idea creators and investors.
- Data collected on the design of crowdfunding platforms and associated problems at other large firms. Notably, 4 semi-structured interviews with platform managers of 3 large firms.

4 Distributed Decision-Making in the Shadow of Hierarchy: Idea Evaluation Biases in Internal Crowdfunding[1]

4.1 Abstract

Digital technologies enable employees at all levels to participate in strategic decision-making. We examine how hierarchy reaches into such 'democratized' systems, arguing that it is a source of homophily that biases decisions. Using a dataset from internal crowdfunding at one of the world's largest industrial manufacturers, we show that idea evaluators overvalue ideas of hierarchically similar others. This bias is particularly strong if evaluators and creators are not so close as to be rivals and for novel ideas. Tying our results to the literature, we propose an integrated theory on how perceived structural similarity along multiple attributes (e.g., hierarchy, lateral position, function, tenure) biases decision-making in organizations. We contribute to the literatures on distributed decision-making, structural similarity in organizations, and biases in idea evaluation.

1 Previous versions of this chapter were presented at Open and User Innovation Conference, Cambridge, USA, 2016; Academy of Management Annual Meeting, Atlanta, USA, 2017; Sixth Annual European Strategy, Entrepreneurship and Innovation Faculty Workshop, Madrid, Spain, 2017; Munich Summer Institute, Munich, Germany, 2017; DRUID17, NYU Stern, New York, United States, 2017; CINET, Potsdam conference 2017; TIE Conference, Koblenz, Germany, 2017; Kiel Working Paper Series, 2017; Leuphana Entrepreneurship Conference, Lüneburg, Germany, 2018; ICIS Conference, San Francisco, USA, 2018. Initial data collection began during my master thesis (Schöttl, 2016 - Date of submission - December 6st, 2016), additional data collection and data analysis (e.g., experimental data and natural language processing) was conducted during my time at the TUM School of Management until June, 2022.

4.2 Introduction

To strategically renew and create competitive advantage, firms need to select the best projects and initiatives for implementation (Deichmann & Jensen, 2018; Reitzig & Sorenson, 2013). Traditionally, the evaluation and selection of ideas – deciding which will be implemented and which will be abandoned – was the province of upper management (Colombo et al., 2021; Keum & See, 2017). Digital technologies and tools now enable companies to shift from centralized to distributed decision-making, opening up idea evaluation to employees throughout the company via distributed idea evaluation (Reitzig & Sorenson, 2013), prediction markets (Soukhoroukova et al., 2012), and internal crowdsourcing (Malhotra et al., 2017).

Distributed decision-making has several benefits, such as the division of work (Raveendran et al., 2021), the integration of many stakeholders' perspectives (Weiser et al., 2020), and the reduction of idea evaluation biases known to exist in centralized, hierarchical organizational forms (Fuchs et al., 2019). However, this 'democratization' of decision-making may open the door to new biases, particularly since accountability for decisions is diffused to the crowd or is even absent. For instance, research into participative decision-making systems has shown that employees favor ideas from their own business unit (Reitzig & Sorenson, 2013), give lower scores to others' ideas that are thematically close to their work (Boudreau et al., 2016), overvalue their own ideas (Keum & See, 2017) and undervalue coworkers' ideas due to competition for finite resources and "turf wars"(Criscuolo et al., 2017).

We seek to contribute to this emerging understanding by shifting the focus to organizational hierarchy itself – a key aspect of organizational structure that distributed decision-making is supposedly free of. It allows for upward, downward, and peer evaluations, leveling the hierarchical high ground into a supposedly hierarchy-free, egalitarian sphere (Klapper & Reitzig, 2018; Reitzig & Sorenson, 2013). We examine whether hierarchy still

plays a role in distributed idea evaluation systems in which decision-making authority is diffused to a crowd of employees.

We start from the premise that hierarchical position provides specific cues about an ideator, which may distort evaluators' decisions. We investigate *whether* and *how* hierarchical similarity between ideators and evaluators biases idea selection in decentralized decision-making. We also examine the root of this hierarchical similarity bias, suggesting that it is driven by a form of homophily (e.g., Lazarsfeld & Merton, 1954; McPherson, Smith-Lovin, & Cook, 2001). Individuals at a similar hierarchical level face similar challenges regarding for instance the nature of their tasks, sources of expectations and pressure, career aspirations, interactions with superiors, and leadership of subordinates. Thus, hierarchical peers are more likely and better able to empathize with one another, which may lead to favoritism. We predict that this bias is dampened by lateral closeness, which intensifies competition, and amplified by idea novelty, which increases uncertainty.

To test these ideas, we use a unique dataset from an internal crowdfunding initiative at Siemens, one of the world's largest industrial manufacturers. From 2015 to 2022, Siemens asked employees to participate in seven funding rounds on its internal crowdfunding platform. Our data stems from its second crowdfunding initiative, in March 2016. Employees from the corporate R&D department (ideators) submitted 77 ideas, which 264 employees throughout the organization (evaluators) then evaluated. Each evaluator could allocate a budget of up to €3,160; funders remained anonymous throughout. This yielded 20,405 evaluation decision dyads. To control for underlying objective idea quality, we used idea-level fixed-effects designs.

We find that idea evaluations are distorted by the degree of hierarchical similarity between the ideator and the evaluator: evaluators prefer ideas from ideators who are

hierarchically similar to them, as long as they are not so close as to be rivals. We also find this bias to be more pronounced for more novel ideas. Extensive robustness checks as well as 22 post hoc interviews with evaluators support these interpretations. For instance, we show that the hierarchical similarity bias vanishes if the evaluator is blind to the ideator's identity and position. Further, we added an experiment to confirm our results and the indirect, significant effect of hierarchical similarity on idea selection through hierarchy-based homophily.

Our paper is part of the emerging discourse about biases in idea evaluation in organizations, which examines and compares biases in centralized (Criscuolo et al., 2017; Hegde & Tumlinson, 2014; Keum & See, 2017) and distributed forms of organizing (Greenberg & Mollick, 2017; Hwang et al., 2015; Reitzig & Sorenson, 2013). We contribute to this discussion first by showing that distributed idea evaluation systems, whose principal advantage supposedly derives from the absence of hierarchy, are in fact influenced by hierarchical position. Second, we contribute by disentangling *how* and *why* hierarchical similarity affects distributed idea evaluation. We put forward hierarchy-based homophily as the mechanism by which evaluators overvalue the ideas of hierarchically similar others. Hierarchy-based homophily reinforces the theoretical underpinning of the notion that hierarchy is not only a source of authority, but also of identification (Horton, McClelland, & Griffin, 2014). Third, we offer an integrated view on how structural similarity along several dimensions of organizational structure biases decision-making, thereby reconciling contradicting results from the literature on the relationships between structural similarity and interpersonal outcomes. Finally, we contribute to the idea evaluation literature by showing that social evaluation depends not only on evaluated artifact's quality, but also on the evaluated artifact's novelty, since uncertainty makes the evaluation's social context more salient.

4.3 Background

4.3.1 Centralized vs. Distributed Idea Evaluation in Organizations

Decision-making in organizations is typically centralized, i.e. a few individuals have authority over core organizational resources. Individuals high in a firm's hierarchy tend to have more power over valuable resources than those lower in the hierarchy (Magee & Galinsky, 2008). Accordingly, idea evaluation is usually top-down, such that a few individuals at the top of the hierarchy select ideas and intrapreneurial initiatives for implementation (Barney, Foss, & Lyngsie, 2018; Burgelman, 1991).

The widespread adoption of digital technologies has enabled changes in this organization of decision-making (Yoo et al., 2012), allowing for new forms of distributed, decentralized, or democratized decision-making. In distributed decision-making, authority over innovation decisions (such as idea evaluation) shifts from top managers to throughout the organization (Colombo et al., 2021), effectively enabling new participatory approaches to company strategy and innovation (Jarzabkowski, Lê, & Balogun, 2019; Mantere & Vaara, 2008).

These approaches promise to overcome authority's dampening effect on subordinates' motivation (Fehr et al., 2013; Klapper & Reitzig, 2018) and tap into knowledge distributed throughout an organization (Colombo et al., 2021). At the same time, they may introduce new sources of inefficiency, which must be better understood to choose the best decision-making type in a given situation. Recent research has begun to dissect decision biases newly created by distributed evaluation configurations (Colombo et al., 2021; Keum & See, 2017; Reitzig & Sorenson, 2013).

Here, we consider the newly created opportunity for upward and peer evaluation, along with downward evaluation, in distributed decision-making. Hierarchy is ubiquitous in

organizations and therefore likely reaches into distributed, supposedly hierarchy-free decision systems, potentially distorting their functioning. This logic is mirrored in recent calls for research into the "dynamics of simultaneous upward and downward influences" in distributed decision-making (Weiser et al., 2020, p. 990).

4.3.2 Biases in Idea Evaluation

Ideas that are novel to an organization differ from established ideas (Berg, 2016) and are associated with uncertainty (Mueller et al., 2012). Since existing evaluation standards may not accommodate the novelty and uncertainty inherent in new ideas, evaluators may look for additional information to guide their assessments and to incorporate cues above and beyond idea quality into their judgments, thereby introducing potential bias (Mueller et al., 2018). The literature has distinguished between biasing cues rooted in the idea (e.g. Criscuolo et al., 2017), the ideator (e.g. Fuchs et al., 2019), the evaluator (e.g. Berg, 2016), the social context (e.g. Mueller et al., 2018), and the ideator-evaluator relationship (e.g. Reitzig & Sorenson, 2013).

Our work falls into the last group of papers, which show that evaluators may implicitly consider their relationship to the ideator when evaluating ideas. For instance, evaluators deem ideas to be more valuable if they have a shared social identity with the creators, i.e., if they belong to the same group, particularly if that group is a minority (Greenberg & Mollick, 2017). Venture capitalists are more likely to select startups if they share ethnicity (Hegde & Tumlinson, 2014), experience (Franke et al., 2006), or social ties with their team members. Scientists evaluate new proposals as worse if the proposal creator is closer to their own scientific field (Boudreau et al., 2016).

Very few studies on idea evaluation have investigated biases rooted in attributes of organizational structure, or rather individuals' perceptions thereof. A seminal exception is Reitzig and Sorenson (2013), who investigated how lateral (horizontal) closeness distorts idea

evaluation, finding that employees prefer ideas from their own business unit. This in-group bias is less intense if the ideator comes from either larger sub-units (larger units are associated with more distant evaluator-ideator relationships) or more R&D-intensive ones (associated with higher idea creator status).

Embracing this finding, our study considers interactions between multiple attributes of organizational structure, including lateral closeness and newly introducing vertical ideator-evaluator relationships, which are ubiquitous in organizations. Hierarchical proximity has been shown to shape behaviors in reciprocal settings such as coworkers' knowledge exchange (Hwang et al., 2015), but has not been associated with relational biases. We study how similarity along this dimension, singly and in combination with other dimensions of structural similarity, biases decision-making, arguing that the shape of the bias depends on the overall perceived degree of similarity.

4.4 Hypothesis Development

We will now develop argumentation on how an evaluator's hierarchical position relative to the ideator influences an evaluation decision. Specifically, we hypothesize that their hierarchical similarity creates a bias rooted in *hierarchy-based homophily*. We further hypothesize that lateral closeness, as studied by Reitzig and Sorenson (2013), counteracts this bias, since it reinforces rivalry in the creator-evaluator dyad. We also hypothesize that the hierarchy-based homophily bias is amplified by idea novelty.

4.4.1 Hierarchy-Based Homophily in Idea Evaluation

Homophily describes the phenomenon of individuals favoring similar over dissimilar others (McPherson & Smith-Lovin, 1987). Homophily is an ubiquitous phenomenon, since it can be based on a wide range of attributes, including ascribed attributes such as gender, ethnicity, and age (Lazarsfeld & Merton, 1954; McPherson et al., 2001), but also achieved attributes such as

preferences, education, or occupation (Ertug, Brennecke, Kovács, & Zou, 2022). It is rooted in in-group favoritism (Tajfel, 1982; Tajfel & Turner, 1986): shared group membership stimulates mutual understanding and identification with the other person, which leads to favorable treatment (Brewer, 1979; Mullen, Brown, & Smith, 1992).

Homophily shapes individuals' behaviors and their evaluation of others, both on achieved and ascribed characteristics (Ertug et al., 2022). In organizations, homophily influences knowledge-sharing (Hwang et al., 2015), communication (Kleinbaum, Stuart, & Tushman, 2013), and tie formation (Mollica, Gray, & Treviño, 2003). Outside organizations, it has been shown to affect the evaluation of ideas (Greenberg & Mollick, 2017) and of ventures (Franke, Gruber, Harhoff, & Henkel, 2008; Hegde & Tumlinson, 2014).

In our view, hierarchy in organizations can be a source of homophily in organizations (cf. Doyle, Lount, Wilk, & Pettit, 2016; Hwang et al., 2015), leading to preferential idea evaluation based on hierarchical similarity. Similarity in hierarchy provides a basis for identification within a group (i.e. with all others on the same level) and differentiation to an out-group of hierarchically distant others. Mere membership in the same group has been shown to relate to homophilic preference, since it shapes the extent to which individuals feel that they share the same fate (Mael & Tetrick, 1992). This is also true for individuals on the same hierarchy level, since identities may be rooted in hierarchies (Sluss & Ashforth, 2007).

Specifically, workers likely feel that they share the same fate with other workers, and the same is true among middle and top managers, respectively (Corley, 2004). Individuals at the same hierarchical level face similar challenges and problems concerning, for instance, the nature and visibility of their tasks, sources of pressure within the organization, career aspirations and pathways, conflict with superiors, and leadership of subordinates. Thus, individuals at a similar hierarchical level are more likely and better able to put themselves in

one another's shoes and to empathize with one another. In turn, perspective-taking fosters liking (Davis, 2018). With decreasing hierarchical similarity, homophilic preferences will likely decrease, as mutual identification and shared problems decline. Instead, negative emotions such as envy or contempt arise as organizational hierarchies structure individuals into inferiors (who are scorned) and superiors (who are envied) (Fiske, 2010).

Owing to hierarchy-based homophily, we expect individuals to prefer ideas from hierarchical peers. Homophily between individuals is associated with liking (Byrne, 1961), affect (Glaman, Jones, & Rozelle, 1996), and the accentuation of the other's positive attributes (Pearce & Xu, 2012). Homophily also establishes common ground and trust between individuals (Ruef, Aldrich, & Carter, 2003). Homophily-based feelings of liking and trust extend from the person to the information they provide; they decrease uncertainty in communication and increase the provided information's credibility (Hwang et al., 2015). That is, the greater the hierarchical similarity between individuals is, the more the provided information (and ideas) will be perceived as credible and positive. This logic is supported by evidence from funding decisions of venture capitalists (Franke et al., 2006) and from crowdfunding (Greenberg & Mollick, 2017), which showed that homophily produces a preferential treatment of similar others in these contexts. In sum, our expectation is a positive hierarchy-based bias in idea evaluation – evaluators favor ideas of ideators who are hierarchically close to them:

H1: *The greater the hierarchical similarity between an ideator and an evaluator, the more favorable the idea evaluation.*

4.4.2 Lateral Closeness and Hierarchical Similarity Bias

We suggest that the degree of lateral closeness – the horizontal dimension of the organizational structure (Reitzig & Sorenson, 2013) – moderates the relationship between hierarchical

similarity and idea evaluation. Specifically, we argue that the hierarchical similarity bias will be less pronounced for laterally proximate evaluation dyads.

When ideators are laterally distant, increasing hierarchical similarity will be associated with hierarchy-based homophily, as laid out in H1. Evaluators are unlikely to feel a competitive threat in terms of their career goals, resources, or management attention from individuals who are laterally distant, even if they are at a similar hierarchical level. In such conditions, the homophily mechanism is likely to flourish, since employees want to help others in a similar hierarchical situation (cf. Greenberg & Mollick, 2017).

In contrast, if ideators are laterally close to evaluators, growing hierarchical similarity is likely to be associated with less favorable evaluations, since hierarchical similarity combined with lateral closeness engenders competition and rivalry. Research has shown that competition and rivalry become more pronounced when actors are more rather than less similar (Kilduff, Elfenbein, & Staw, 2010; Tesser, Millar, & Moore, 1988). In turn, rivalry among similar ranks may induce adverse behaviors (Gould, 2003), since individuals increase their competitive behaviors to outperform a rival (Garcia, Tor, & Gonzalez, 2006). Competition is more likely to yield conflict under status similarity (Piezunka, Lee, Haynes, & Bothner, 2018a).

In our setting, individuals who are both hierarchically and laterally close are likely in a competitive situation with opposed goals (Deutsch, 1949; Kilduff, 2019, p. 776). They compete for scarce resources such as budgets, promotions, and management attention, where the one's gain comes at the loss of the other. In this case, evaluators are likely to be more hesitant to support the ideas of those in a similar hierarchical position. In sum, we propose that lateral proximity attenuates the positive effect of hierarchical similarity on idea evaluation, as perceived rivalry intensifies:

H2: *The upward bias of hierarchical similarity on idea evaluation is weakened by lateral proximity.*

4.4.3 Idea Novelty and Hierarchical Similarity Bias

We will now investigate how the characteristics of the idea under evaluation shape the hierarchical similarity bias. Specifically, we suggest that the degree of idea novelty affects the relationship between hierarchical similarity and idea evaluation, such that the hierarchical similarity bias will be more pronounced for more novel ideas.

Since novel ideas differ more from existing solutions than more conventional ideas, their value is harder to assess. Judging novel ideas requires new frames of reference, creating uncertainties that make idea evaluation particularly prone to biases (Criscuolo et al., 2017; Tversky & Kahneman, 1974): For novel ideas, the share of cognitive processing that relies on the social context rather than the idea itself is higher; evaluators tend to appraise ideas based on the evaluation's social context, relying on their understanding of the source (Menon & Blount, 2003). Hierarchical similarity is a readily available cue that evaluators will consider in lieu of the quality of highly novel ideas.

In contrast, when evaluating less novel ideas, evaluators find it easier to rely on rational evaluation, i.e. to evaluate the idea rather than its creator, since they are familiar with such ideas and can draw on existing knowledge schemas and frames of reference (Meyers-Levy & Tybout, 1989). Thus, evaluators are less likely to consider ideator cues such as hierarchical similarity. We therefore propose:

H3: *The upward bias of hierarchical similarity on idea evaluation is amplified by idea novelty.*

4.5 Empirical Strategy

4.5.1 Research Context

Our data came from an internal crowdfunding initiative at Siemens, a large European technology company focused on industry, infrastructure, transport, and healthcare, between February 1 and March 7, 2016. We chose this context because it satisfied our sampling criteria: ideators and evaluators must be embedded in the same hierarchically structured organization and there must be the possibility of downward, upward, and peer evaluations.

The crowdfunding initiative comprised an ideation phase and an evaluation phase. The ideation phase lasted five weeks, during which employees from the corporate research department could submit one or more project ideas to an internal online platform. The minimum requirements for a project proposal included the targeted funding sum, descriptions of the deliverables, tasks, and milestones, and the ideator's name and department. Further, ideators could upload pictures, videos, and other information as well as a portrait photograph of themselves. There was no restriction on the project topics and no pre-upload vetting of ideas. The idea suggestions could be viewed but not evaluated during the ideation phase. Seventy-seven ideators submitted 77 project proposals.

The evaluation phase followed immediately after the ideation phase. Of approximately 470 employees who had signed up to be evaluators, 264 actually invested in the project proposals. Each evaluator received a budget of €3,160, which could be allocated among the 77 ideas in €1 increments. Investments could not be revoked. The evaluators remained anonymous throughout and after the contest to participants.

4.5.2 Measurement

4.5.2.1 Dependent Variable

Our main dependent variable is *Idea selection*, which captures whether or not an evaluator invested any money into a given idea. In alternative model specifications, we checked whether our findings held when we used the share of requested funding awarded (*Fraction funded*) and the total amount that an evaluator has allocated to a given idea (*Funding amount*) as dependent variables.

4.5.2.2 Independent and Moderator Variables

To measure perceived *Hierarchical similarity*, we used the number of hierarchical levels between a given ideator and evaluator as a proxy (Hill, Seo, Kang, & Taylor, 2012). To do so, we exploited the organizational code displayed next to the ideator's name on the crowdfunding platform, which indicated the number of levels between the ideator and the CEO. We verified all the codes in the sample by comparing them to the organizational charts.

Hierarchical similarity captures the inverse of the absolute difference between the creator's number of levels to the CEO and the evaluator's (absolute difference *(-1)). This variable ranges from -7 (most dissimilar) to 0 (most similar, i.e. same hierarchical level).

The first moderator we used was *Lateral closeness*, i.e. the horizontal proximity between any given creator-evaluator pair. We measured this proximity like Reitzig and Sorenson (2013) (1 = the same business unit or closer; 0 = the same division or more distant).

For our second moderator, we measure *idea novelty* with the content distance between the proposed idea and previous innovation projects at Siemens. To calculate content distance, we use the textual description of each idea and compare it to the descriptions of more than 10,000 projects that had been implemented by the organization in the previous four years. To this end, we first stem the word descriptions of all ideas using the quanteda R package. We also

convert all words into lowercase and remove punctuation, numbers, blank spaces, and stop words that add little information owing to their common occurrence in English. Then, in a 'bag of words' approach, we transform textual descriptions into word vectors. We calculate the cosine similarity between each of the 77 vectors (representing the ideas) and the vector representing all projects from the project database. To ensure a greater weight of unique words in a certain idea and a lower weight of words that were common across all ideas, we employ a weighting strategy that emphasizes unique words (for the process we follow, see Piezunka & Dahlander, 2015). To calculate our novelty measure based on content distance, the obtained cosine similarity is deducted from 1. This measure's face validity was corroborated in conversations with company managers.

4.5.2.3 Control Variables

To assess hierarchical similarity's effect on idea selection, it is essential to control for idea quality and presentation. We do so by fixing unobserved variance at the idea level. Thus, the number of ideas drops to 58, since ideas can only be considered if some but not all or none of the evaluators funded them. (We rerun all analyses using a random-effects specification with all 77 ideas; our findings remain fully intact.)

We also control for the potential effect of existing personal relationships between ideator and evaluator. To this end, we use four variables: First, we control for *Lateral closeness* (our moderator variable), a proxy for the existence of personal ties – thus accounting for the fact that lateral closeness can bias idea evaluation (Reitzig & Sorenson, 2013). Second, we use the number of messages an evaluator and a creator sent each other via the platform before the evaluation phase started (*Communicational intensity*). Third, we control for the *Geographical*

distance (in km) between the office locations of the evaluator and the ideator.[2] Fourth, we control for whether or not the ideator and the evaluator were located in the *Same country*.

Besides personal relationships, we also consider evaluator-creator reciprocity as a mechanism that could potentially obfuscate our findings. To this end, we control for the number of likes that individuals gave one another on ideas and comments during the ideation phase (*Mutual likes*).

We also control for other variables, such as gender (*gender similarity*) (1 if yes, and 0 otherwise), the *Evaluator's hierarchical position* (steps to the CEO), and whether or not an idea was tagged by the ideator as relevant to the evaluator's division (*Idea relevance to the evaluator's division*). Further, we control for potential herding behavior by including the *Share funded* and *Share funded squared*, a variable that measures the funding that an idea had received relative to its target budget at the time of the focal investment.

Table 2 lists the variables. The descriptive statistics can be found in Table 3. Our findings are summarized in Table 4.

[2] We used R's geosphere package (Hijmans, Williams, and Vennes, 2019) and its function distVincentySphere (Vincenty, 1975).

Table 2 Descriptions of the Variables

Variable name	Explanation	Level	Data source
Idea selection	Dummy = 1 if the evaluator has invested in a given idea	Dyad	Crowdfunding platform
Fraction funded	The share of the requested funding awarded by the evaluator in relation to the total funding requested	Dyad	Crowdfunding platform
Funding amount	The total amount an evaluator allocated to a given idea	Dyad	Crowdfunding platform
Hierarchical similarity	Inverse of the absolute difference between the creator's number of levels to the CEO and the evaluator's (absolute (difference) *(-1))	Dyad	Crowdfunding platform + company directory
Downward hierarchical similarity	Same as hierarchical similarity, but = 0 if the ideator was hierarchically above the evaluator	Dyad	Crowdfunding platform + company directory
Upward hierarchical similarity	Same as hierarchical similarity, but = 0 if the ideator was hierarchically below the evaluator	Dyad	Crowdfunding platform + company directory
Lateral closeness	The evaluator and the ideator are from: 1 = the same business unit or closer 0 = the same division or more distant	Dyad	Company directory
Idea novelty	The content distance between the proposed idea and prior innovation projects at Siemens, calculated employing cosine similarity -1	Idea	Crowdfunding platform + company project database
Communication intensity	The number of messages the evaluator and the ideator exchanged before the evaluation phase started	Dyad	Crowdfunding platform
Geographical distance	Distance (in km) between the evaluator's and the ideator's office locations	Dyad	Crowdfunding platform + company directory
Same country	Dummy = 1 if the evaluator and the ideator were from the same country	Dyad	Company directory
Mutual likes	The number of likes that the ideator and the evaluator gave each other during the idea creation phase	Dyad	Crowdfunding platform
Gender similarity	Dummy = 1 if evaluator and creator have the same gender	Dyad	Company directory
Evaluator's hierarchical position	The evaluator's number of steps to the CEO	Evaluator	Crowdfunding platform + company directory

Idea relevance for evaluator's division	Dummy = 1 if the ideator indicated that an idea is relevant to the evaluator's unit, and 0 otherwise	Dyad	Crowdfunding platform
Share funded	Share of the target funding reached at the time of evaluation	Dyad	Crowdfunding platform

Table 3 The Descriptive Statistics

	Variable	Obs	Mean	Std. Dev.	Min	Max	1	2	3	4	5
1	Idea selection	20,328	0.027	0.163	0.000	1.000	1.000				
2	Funding amount	20,328	39.682	293.051	0.000	3160.000	0.810	1.000			
3	Hierarchical similarity	20,328	-1.520	1.502	-7.000	0.000	0.068	0.073	1.000		
4	Hierarchical similarity upwards	20,328	-0.728	1.295	-5.000	0.000	0.049	0.050	0.566	1.000	
5	Hierarchical similarity downwards	20,328	-0.792	1.316	-7.000	0.000	0.029	0.034	0.584	-0.338	1.000
6	Lateral closeness	20,328	0.243	0.429	0.000	1.000	0.113	0.110	0.428	0.227	0.265
7	Idea novelty	77	0.155	0.031	0.077	0.235	0.032	0.036	0.042	-0.028	0.076
8	Communicational intensity	20,328	0.020	0.226	0.000	7.000	0.116	0.106	0.015	0.012	0.005
9	Geographical distance	20,328	1803.146	3008.097	0.000	19034.000	-0.027	-0.033	0.085	0.001	0.097
10	Same country	20,328	0.399	0.490	0.000	1.000	0.102	0.098	0.083	-0.081	0.174
11	Mutual likes	20,328	0.006	0.078	0.000	2.000	0.101	0.112	0.046	0.027	0.026
12	Gender similarity	20,328	0.810	0.392	0.000	1.000	0.009	0.008	-0.014	-0.009	-0.007
13	Evaluator's hierarchical position	264	4.727	1.622	1.000	8.000	0.014	0.002	-0.332	-0.819	0.427
14	Relevance for evaluator's division	20,328	0.652	0.476	0.000	1.000	0.022	0.018	-0.023	0.024	-0.050
15	Share funded	20,328	0.150	0.260	0.000	1.000	0.090	0.077	-0.055	-0.036	-0.028

	Variable	6	7	8	9	10	11	12	13	14	15
1	Idea selection										
2	Funding amount										
3	Hierarchical similarity										
4	Hierarchical similarity upwards										
5	Hierarchical similarity downwards										
6	Lateral closeness	1.000									
7	Idea novelty	-0.041	1.000								
8	Communicational intensity	0.011	0.013	1.000							
9	Geographical distance	-0.044	0.091	-0.011	1.000						
10	Same country	0.043	-0.133	0.018	-0.441	1.000					
11	Mutual likes	0.065	-0.001	0.178	-0.020	0.048	1.000				
12	Gender similarity	0.065	0.004	0.010	-0.006	-0.049	-0.007	1.000			
13	Evaluator's hierarchical position	0.043	0.000	-0.016	-0.047	0.037	-0.002	0.058	1.000		
14	Relevance for evaluator's division	0.009	0.073	0.019	-0.044	-0.040	0.005	0.030	0.030	1.000	
15	Share funded	-0.019	0.202	0.005	-0.101	0.057	0.002	-0.005	0.018	0.078	1.000

4.5.3 Selection Treatment

Participation in the crowdfunding contest was not random, because evaluators self-selected to participate in idea evaluation. To mitigate against potential selection effects, we introduced a correction factor (Mills ratio).

Notably, the system was closed once €530,000 had been spent on fully funded ideas. Evaluators who had not spent their personal budgets at that time would be unable to do so. Interestingly, the overall budget was spent after six hours of evaluation time,[3] giving only 56% of the registered evaluators time to be involved. We assumed that, concerning their motivation to participate, the employees who had signed up but did not participate (i.e. would-be evaluators) were more similar to those who did not sign up (i.e. the rest of the Siemens population) than to those who had signed up and participated (i.e. the evaluators). We argue that if the selection between would-be evaluators and evaluators does not bias our results, then the selection between the Siemens population and the evaluators is also likely to be unbiased.

To check for a selection effect between the would-be evaluators and the evaluators, we used a Heckman selection model (Heckman, 1976) and calculate the inverse Mills ratio of all 470 employees who had registered. We use the time zone in which an individual was located as an exclusion restriction. As the evaluation phase started at 11:30am UTC+1 (Central European Time), being far from this time zone would affect the decision to participate, but not the spending behavior. We use a probit regression to predict the likelihood of participation (coefficient = -0.310, p = .000; model: log likelihood = -24,845.144, p = .000) and calculate the inverse Mills ratio based on these results. We include the Mills ratio in our regressions to

[3] The evaluators had time to familiarize themselves with the ideas in the previous weeks.

mitigate selection effects. Our findings remain materially unchanged compared to when we do not include the inverse Mills ratio.

4.6 Findings

4.6.1 H1: Hierarchical Similarity

Our expectation from H1 is for hierarchical similarity's effect to be positive. In support of H1 (see Model 1 in Table 4), we find that *Hierarchical similarity* has a positive and significant effect on *Idea selection* (b = 0.279 p = .000). The odds ratio for *Hierarchical similarity* is 1.322 ($e^{b = e0.279}$ = 1.322), i.e. the likelihood of funding an idea decreases by about 24% with each hierarchy step separating idea selectors and creators.

Table 4 Findings

	Model 1 Logit			Model 2 Logit			Model 3 Fractional logit			Model 4 Tobit		
	b	SE	p	b	SE	p	b	SE	p	b	SE	p
Constant	-3.941	1.304	.003	-3.857	1.295	.003	-23.468	2.134	.000	-18590.310	4822359.000	.997
Hierarchical similarity	0.279	0.053	.000				0.254	0.063	.000	316.979	64.573	.000
Hierarchical similarity upwards				0.258	0.063	.000						
Hierarchical similarity downwards				0.300	0.067	.000						
Hierarchical similarity x lateral closeness												
Hierarchical similarity x idea novelty												
Lateral closeness	1.232	0.142	.000	1.232	0.142	.000	1.273	0.185	.000	1485.462	180.996	.000
Communicational intensity	0.847	0.099	.000	0.847	0.099	.000	0.543	0.101	.000	1132.875	133.752	.000
Geographical distance	0.000	0.000	.000	0.000	0.000	.000	0.000	0.000	.049	0.195	0.037	.000
Same country	1.568	0.161	.000	1.568	0.161	.000	1.629	0.225	.000	1632.964	189.303	.000
Mutual likes	1.000	0.274	.000	1.000	0.274	.000	1.003	0.252	.000	1677.254	384.666	.000
Gender similarity	0.220	0.160	.168	0.220	0.160	.168	0.351	0.350	.316	355.436	196.120	.070
Evaluator's hierarchical position	0.021	0.038	.576				-0.086	0.044	.048	15.828	44.656	.723
Idea relevance for evaluator's division	0.321	0.239	.180	0.321	0.239	.180	-0.104	0.509	.838	313.338	267.642	.242
Share funded	4.610	0.700	.000	4.610	0.700	.000	4.234	1.041	.000	5803.335	911.331	.000
Share funded squared	-5.081	0.755	.000	-5.081	0.755	.000	-5.497	1.089	.000	-6615.496	974.504	.000
Mills ratio	-2.468	1.763	.162	-2.468	1.763	.162	0.334	2.724	.902	-3800.370	2368.029	.109
Idea fixed effects		Yes			Yes			Yes			Yes	
N	15312.000			15312.000			17952.000			17952.000		
ll	-1669.502			-1669.502			-123.307			-5699.230		

	Model 5 OLS			Model 6 Logit			Model 7 Logit		
	b	SE	p	b	SE	p	b	SE	p
Constant	78.435	64.404	.223	-3.656	1.316	.005	-3.821	1.312	.004
Hierarchical similarity	10.201	1.971	.000	0.355	0.057	.000	-3.469	1.243	.005
Hierarchical similarity upwards									
Hierarchical similarity downwards									
Hierarchical similarity x lateral closeness				-0.506	0.114	.000			
Hierarchical similarity x idea novelty							4.456	1.481	.003
Lateral closeness	65.124	6.189	.000	0.918	0.157	.000	1.246	0.142	.000
Communicational intensity	113.050	9.341	.000	0.865	0.100	.000	0.844	0.099	.000
Geographical distance	0.006	0.001	.000	0.000	0.000	.000	0.000	0.000	.000
Same country	55.689	5.806	.000	1.600	0.163	.000	1.580	0.161	.000
Mutual likes	340.135	27.732	.000	1.035	0.272	.000	1.004	0.273	.000
Gender similarity	9.946	6.134	.105	0.233	0.160	.147	0.226	0.160	.158
Evaluator's hierarchical position	2.508	1.425	.078	0.009	0.039	.814	-0.014	0.040	.724
Idea relevance for evaluator's division	-2.460	8.042	.760	0.306	0.238	.199	0.331	0.239	.166
Share funded	218.151	36.980	.000	4.468	0.700	.000	4.574	0.699	.000
Share funded squared	-295.545	38.603	.000	-5.024	0.755	.000	-5.051	0.753	.000
Mills ratio	-206.623	88.596	.020	-2.623	1.776	.140	-2.379	1.775	.180
Idea fixed effects		Yes			Yes			Yes	
N	17952.000			15312.000			15312.000		
ll	-126409.100			-1659.972			-1665.002		

Moving to the control variables, the *Share funded* affects evaluation decisions in a nonlinear way, likely owing to evaluators being unable to provide additional funding once an idea had been fully funded. The effects of *Gender similarity*, of the *Evaluator's hierarchical position*, and *Idea relevance to the evaluator's division* are insignificant.

Perhaps more interestingly, we control for a number of variables that account for the potential effect of personal relationships: organizational proximity (measured as *Lateral closeness*), geographical proximity (measured as *Geographical distance*), *Same country*, and the extent of prior communication on the crowdfunding platform. All these variables are significantly related to the amount of funding received. Like Reitzig and Sorenson (2013), we find that *Lateral closeness* in the organization positively affects *Idea selection*. Further, ideators are more likely to receive funding from an evaluator if they are co-located in the same country or have previously interacted on the platform. These three control variables support the notion that evaluators are more likely to fund ideators with whom they have a personal relationship. The fourth variable, *Geographical distance*, is not in line with this interpretation – individuals evaluate ideas better when the ideator is geographically more distant. However, this may be a suppression effect, since geographical distance becomes insignificant when the other control variables for personal relationships are not included in the regression. All in all, we are confident that these different variables act as indicators to control for the likelihood that ideators and evaluators have personal relationships with each other.

To strengthen our findings on our main effect proposed in H1, we conduct three further analyses. First, we check whether the hierarchical similarity effect differs depending on whether evaluators assessed ideas from ideators above or below them. The effects of upward hierarchical similarity and downward hierarchical similarity are both positive (see Model 2 in Table 4), there being no significant difference between the coefficients ($p = .576$).

Second, we check whether our findings hold when we consider that evaluators not only select projects, but also assign money to them. To do so, we use three models. We replicate our model with a fractional outcome capturing the share of funding awarded to requested funding (ranging between 0 and 1) (see Criscuolo et al., 2017). *Hierarchical similarity*'s effect remains the same (see Model 3 in Table 4). We also replicate our model using *idea evaluation* as the dependent variable, which captures the total amount an evaluator allocated to a given idea; it ranged between €0 and €3,160 in €1 increments. We use a tobit specification and our findings hold (*Hierarchical similarity* coefficient = 316.979, p = .000) (see Model 4) as well as with an OLS specification (*Hierarchical similarity* coefficient = 10.201, p = .000) (see Model 5).

Third, we rule out the possibility that the hierarchical similarity bias is an artifact of the distribution of ideators' and evaluators' hierarchical positions. For instance, if there were a concentration of high-quality ideas on one hierarchical level of ideators and there were also many evaluators on that level, the relationship between *Hierarchical similarity* and *Idea selection* may be overestimated. To rule out this possibility, we perform three checks: First, we randomly reassign the investments to evaluators, leaving unchanged the data on the evaluators' and ideators' personal characteristics, especially their hierarchical positions. If our results are only an artifact of the distribution of the dyads, we would find the hierarchical similarity bias despite the random reallocation of investments; this is not the case. The resulting regression analysis shows an insignificant relationship between *Hierarchical similarity* and *Idea selection* (coefficient = 0.025, p = .553). As a second check, we control for evaluators' hierarchical levels using dummies. This specification helps absorb all hierarchy-specific effects and accounts for potential confounders rooted in hierarchy. Our findings remain robust to this specification (coefficient = 0.368, p = .000). In a third check, we use evaluator-fixed effects to absorb all

evaluator-level variance. Our findings also remained robust to this specification (coefficient = 0.359, p = .000).

4.6.2 H2: The Moderating Effect of Lateral Closeness

To test H2, we check whether *Lateral closeness* moderates the relationship between *Hierarchical similarity* and *Idea selection.* We use the same model as for testing H1, but add the interaction between *Hierarchical similarity* and *Lateral closeness*. As shown in Model 6 (Table 4), the positive relationship between *Hierarchical similarity* and *Idea selection* is stronger for more laterally distant evaluations – the interaction effect is significant (coefficient = -0.506, p = .000). *Hierarchical similarity*'s effect is positive and significant for distant evaluations (coefficient = 0.007, p = .000), and negative but insignificant for close evaluations (coefficient = -0.010, p = .214). (See also Figure 7, which shows marginal effects; *Lateral closeness* is depicted as 1 = close and 0 = distant.) In other words, *Hierarchical similarity* produces a positive evaluation bias for distant evaluations, but this bias disappears for close evaluations.

As an ancillary analysis, we examine this interaction from the perspective of Reitzig and Sorenson's paper, i.e. we check whether favoritism among employees from the same business unit is reduced by hierarchical parity. Our earlier contention was that laterally distant evaluations are favorable at similar hierarchical levels, since hierarchical homophily will be the dominant mechanism. In contrast, if ideators are laterally close to evaluators, we theorized that hierarchical similarity is likely associated with less favorable evaluations, since hierarchical similarity combined with lateral closeness engenders rivalry. Thus, evaluators should prefer ideas from the same unit if idea evaluators and creators are at different hierarchical levels. However, if idea evaluators and creators are hierarchical peers, evaluators should prefer ideas from a different unit.

To explore this idea, we dichotomized hierarchical similarity into hierarchically similar (same hierarchical level) and hierarchically distant (different hierarchical level) (Hwang et al., 2015)[4]. Then, using the same specification as in the main analysis, we test the interaction between lateral and hierarchical proximity, finding it to be significant. A more detailed inspection (for an interaction plot, see Figure 8) reveals three things. First, the effect of *Hierarchical similarity (dichotomous)* is positive and significant for laterally distant evaluations (coefficient = 0.007, p = .043), and negative but insignificant for close evaluations (coefficient = -0.020, p = .085). Second, the effect of *Lateral closeness* is always positive, but is weaker for ideas from creators at the same hierarchical level (coefficient = 0.049, p = .000) than for creators from different hierarchical levels (coefficient = 0.076, p = .000). Third, contrast analysis indicates that, compared to different-level evaluation, idea evaluation is more positive for same-level evaluation outside the unit (contrast = 0.007, p = .043), but insignificantly negative for same-level evaluation within the unit (contrast = -0.020, p = .085).

In sum, these analyses confirm that structural similarity relates positively to idea selection for low structural similarity values, but that the effect becomes less strong, and potentially even negative at some point. We incorporate these insights into an integrated theoretical framework in Section 4.7.

[4] Hwang et al. (2015) labelled this measure *status similarity*. We label it *hierarchical similarity*, since status can be based on a number of other categories, such as education, race, gender (Magee & Galinsky, 2008), or performance outcomes (Piezunka, Lee, Haynes, and Bothner, 2018b).

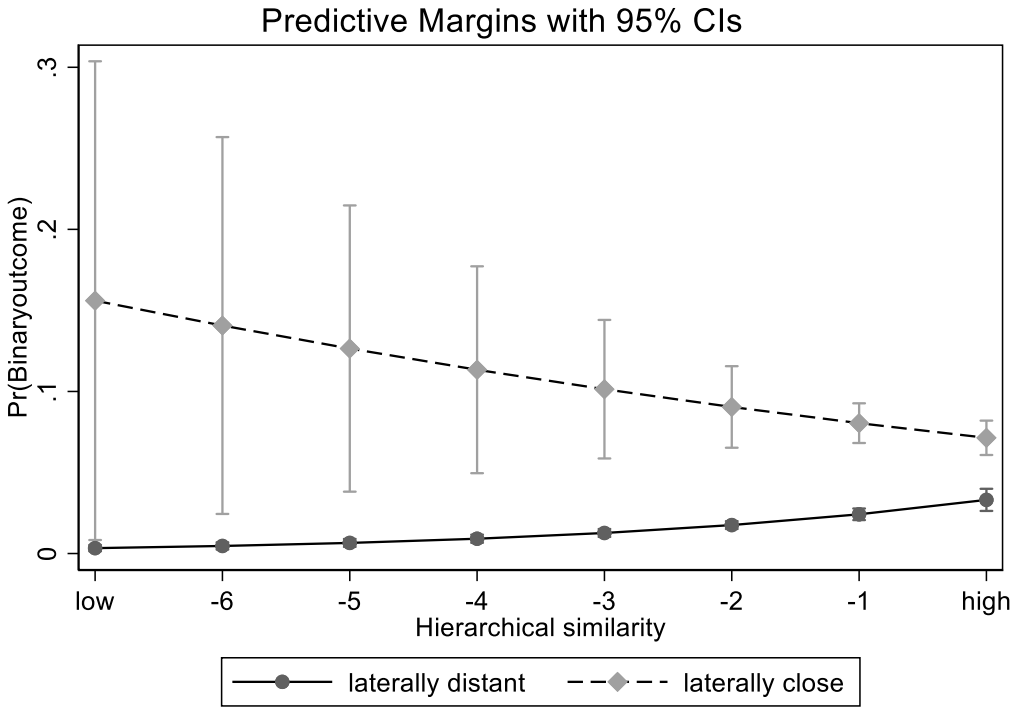

Figure 7 Effects of Hierarchical Similarity for Laterally Close vs. Distant Evaluations

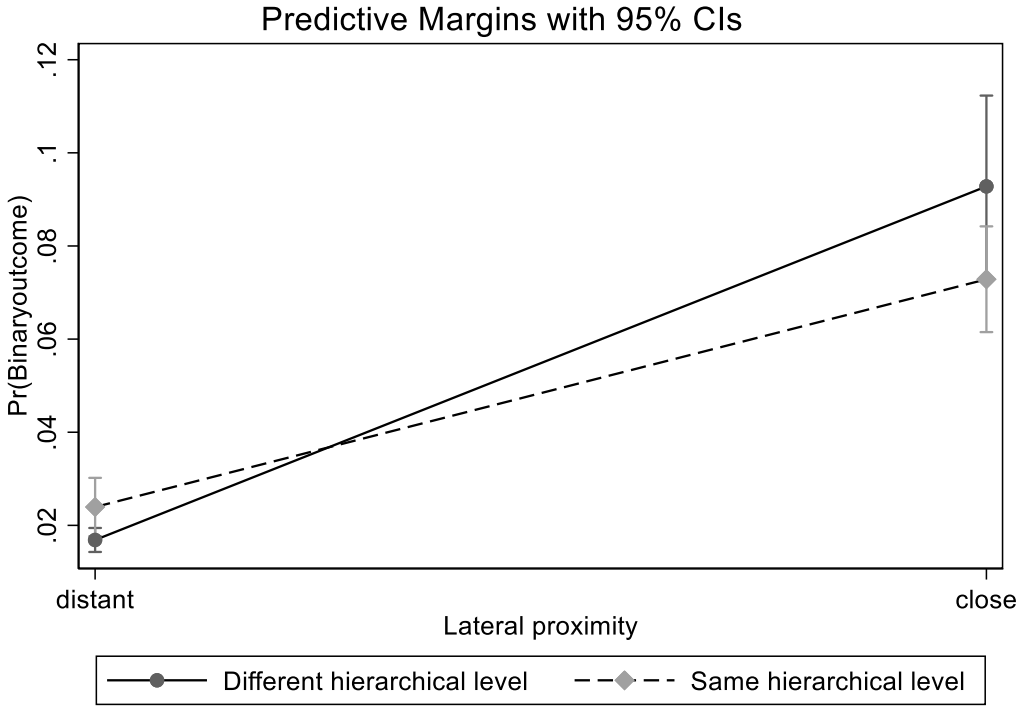

Figure 8 Effects of Lateral Similarity for Hierarchically Close vs. Distant Evaluations

4.6.3 H3: The Moderating Effect of Idea Novelty

To test H3, we investigate whether the degree of idea novelty moderates the relationship between *Hierarchical similarity* and *Lateral closeness*. To this end, we use the same model as above, fixing the idea variance. Thus, the main effect of novelty is not included in the regressions (the effect is negative but insignificant when we used random-effects models). Instead, we include *Idea novelty* as a moderator on the relationship between *Hierarchical similarity* and *Idea selection*. We use the same control variables set as in the main analysis.

As shown in Model 7 in Table 4, the positive relationship between *Hierarchical similarity* and *Idea selection* is stronger for more novel ideas (interaction term coefficient = 4.456, p = .003). *Hierarchical similarity*'s effect is positive for nonnovel ideas (coefficient = 0.004, p = .007), but larger for novel ideas (coefficient = 0.011, p = .000). (See also Figure 9; novelty is depicted at +/- 1 SD.) This indicates that the positive evaluation bias produced by *Hierarchical similarity* is stronger for more novel ideas.

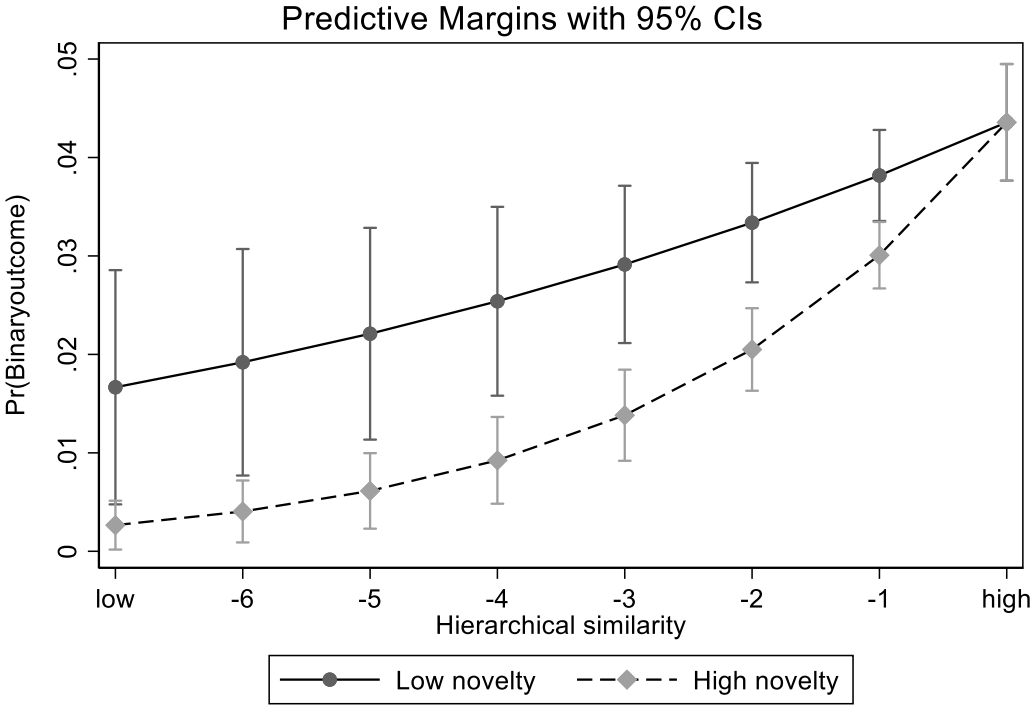

Figure 9 Effects of Hierarchical Similarity for High-Novelty and Low-Novelty Ideas

4.6.4 Mechanisms

We will now build support for our argument that hierarchy-based homophily is the underlying process that leads evaluators to overvalue ideas of hierarchically similar others. First, we will rule out two other potential pathways: one, that evaluators like hierarchically close others' idea content better (the informational pathway) (Section 4.6.4.1); two, that people in similar hierarchical positions are more likely to interact and thus prefer one another's ideas (the relational pathway) (Section 4.6.4.2). We will then show experimental support for our suggested – structural – pathway (Section 4.6.5).

4.6.4.1 Ruling Out the Informational Pathway

First, we need to rule out information as the principal mechanism underlying our findings, specifically the notion that preferential evaluation of hierarchical peers is due to some aspects of the presented idea content. First, our models used idea-level fixed effects. Thus, the hierarchical similarity bias we observed is not rooted in the information provided (i.e. the ideas).

Second, we exploit a part of our dataset in which the ideators remained anonymous owing to their country's privacy laws (see Table 5). Evaluators were therefore blind to these ideators' identities as well as their positions in the organization. This dataset included nine ideas and 2,376 evaluator-creator pairs, which we had excluded from the main analysis. To check our contention about hierarchy-based social evaluations of ideas, we look for hierarchy effects in this anonymous sample. To this end, we add the interaction effect between *Hierarchical similarity* and the observability of the hierarchical position: This interaction is significant (coefficient = -0.425, p = .001). Specifically, we find that hierarchical similarity's effect is significant for non-anonymous ideas (coefficient = 0.287, p = .000), but insignificant for the anonymous sample (coefficient = -0.138, p = .61). This strongly supports our contention that

evaluations are affected by social cues; conversely, it rules out any alternative explanation that is based on idea content.

Table 5 Ruling out the Informational Pathway (Anonymous Sample Included)

	Model		
	Logit		
	b	SE	p
Constant	-4.215	1.246	.001
Hierarchical similarity	0.287	0.052	.000
Idea creator anonymous	0.695	0.536	.194
Hierarchical similarity x Idea creator anonymous	-0.425	0.128	.001
Lateral closeness	1.190	0.132	.000
Communicational intensity	0.839	0.095	.000
Geographical distance	0.000	0.000	.000
Same country	1.747	0.149	.000
Mutual likes	0.973	0.263	.000
Gender similarity	0.176	0.149	.237
Evaluator's hierarchical position	-0.001	0.037	.982
Idea relevance for evaluator's division	0.537	0.221	.015
Share funded	4.633	0.666	.000
Share funded squared	-5.188	0.717	.000
Mills ratio	-2.135	1.675	.203
Idea fixed effects		Yes	
N	17424.000		
ll	-1884.273		

4.6.4.2 Ruling Out the Relational Pathway

Here, we consider the possibility that hierarchical similarity leads to favoritism because people in similar hierarchical positions are more likely to interact or engage in reciprocal behavior (Aadland, Cattani, Falchetti, & Ferriani, 2020). Several patterns in the data contradict this explanation.

First, the support for H2 speaks against a purely relational explanation for our findings. If the relationship between hierarchical similarity and favorable idea evaluation were only driven by the relationships between employees, we would expect hierarchical similarity's effect to be stronger for more proximate peers. Instead, the hierarchical similarity bias is weaker for those who are laterally proximate. Similarly, the positive effect on evaluating others within the same unit is weaker if the idea creator and the idea evaluator are at the same hierarchical level. Second, our control variables set mitigates the concern that our findings are chiefly relational:

even after accounting for variables that capture relationships such as *Communication intensity* and being in the *Same country*, hierarchical similarity's effect remains intact.

Further, we examine whether our findings are driven by relational mechanisms in the form of reciprocal behavior. Although ideators never learnt the sources of their funding, and we have already controlled for reciprocal likes, we further check whether our findings are affected by evaluators who are ideators themselves (for the results, see Table 6). Only for these 35 individuals would it be possible to engage in reciprocal behavior in the form of mutually promoting each other's ideas. If reciprocal behavior drove our findings, our *Hierarchical similarity* effect should have disappeared for individuals who did not provide ideas themselves. However, the interaction effect shows no differences between the two groups (coefficient = -0.038, p = .746), indicating that *Hierarchical similarity*'s effects are significantly positive for both non-ideators (coefficient = 0.283, p = .000) and ideators (coefficient = 0.245, p = .035).

Table 6 Ruling out the Relational Pathway – Controlling for Reciprocity

	Model		
	Logit		
	b	SE	p
Constant	-4.644	1.352	.001
Hierarchical similarity	0.283	0.055	.000
Evaluator is also idea creator	-0.432	0.192	.030
Hierarchical similarity x Evaluator is also idea creator	-0.038	0.116	.746
Lateral closeness	1.246	0.143	.000
Communicational intensity	0.865	0.101	.000
Geographical distance	0.000	0.000	.000
Same country	1.574	0.162	.000
Mutual likes	1.299	0.305	.000
Gender similarity	0.219	0.161	.173
Evaluator's hierarchical position	0.019	0.038	.611
Idea relevance for evaluator's division	0.322	0.237	.174
Share funded	4.584	0.700	.000
Share funded squared	-5.077	0.754	.000
Mills ratio	-1.373	1.842	.456
Idea fixed effects	Yes		
N	15312.000		
ll	-1666.418		

Further, we consider the possibility that individuals from similar hierarchical levels are more likely to engage in funding coalitions. In this case, we would expect them to fund projects early to fulfill their coalition obligation, or later, in case the funding limit is not met and additional funding is required. Thus, we check whether hierarchical similarity is associated with receiving funding earlier or later in time. We test this idea by regressing minutes after the contest started on the same variable specification as in the main tests, using a reduced dataset that only included the funded projects. We found no relationship between hierarchical distance and time of evaluation (coefficient = 74.288, p = .226).

Finally, we added a control variable that captured to what extent individuals were more likely to reciprocate funding, after they had received from another employee. We find that individuals were indeed more likely to reciprocate funding (coefficient = 1.127, p = .017), but *Hierarchical similarity*'s effects remains significant and almost equal in size as in our original specifcation (coefficient = 0.276, p = .000).

In sum, even if we cannot rule out that relational pathways coexist with our proposed mechanism, none of these analyses challenge hierarchy-based homophily as a pathway.

4.6.5 Experimental Support for the Structural Pathway

For our final analysis, we designed a scenario-based online experiment to (1) replicate our field data, (2) investigate the causality of the observed main effect in a controlled environment, and (3) test our proposed structural mediating mechanism. We randomly assigned participants to a hierarchy level in an idea evaluation scenario and asked them to evaluate three ideas stemming from different hierarchical levels. We then tested the mediating mechanism of hierarchical homophily on idea evaluation.

4.6.5.1 Participants

For our online experiment, we recruited 271 participants from Prolific, a platform for behavioral research with high-quality data (Gordon, Rothschild, Damer, Peer, & Evernden, 2021; Peer, Brandimarte, Samat, & Acquisti, 2017). Individuals were paid to participate in the study. We restricted potential participants to those currently located in the U.S. and participants with a 95% or higher approval rating on Prolific. We only invited potential participants who were at least part-time employed in a firm in order to make the study context more tangible. The study was conducted in November 2021. To ensure high reliability of responses, we followed previous research and excluded participants who failed a question testing their attention (Meyvis & van Osselaer, 2018).

The final sample consists of 248 participants (M_{age} = 33 years, 61% female) who rated three ideas each (744 observations). When asked about the size of the biggest firm they had worked for in the past five years, with 75% of participants indicating having worked for a firm with at least 50 employees.

4.6.5.2 Material and procedure

We recruited participants via Prolific to an online survey tool and asked them to imagine that they work for a firm that produces locks for bicycles. Similar to the process in the field study, they were asked to evaluate ideas submitted by other employees and to decide which ones to implement.

The ideas were based on prior experiments. All ideas were pretested in a previous experimental study to ensure similar length and quality perceptions. The ideas are described in detail in Table A11 in the appendix. We also checked that ideas were formulated in a similar way (see Tausczik & Pennebaker, 2010).

Between subjects, our participants were randomly assigned to one of three hierarchical levels (hierarchical position: top vs. medium vs. low level) and were shown their position in an organizational chart (for a similar approach, see Keum & See, 2017). Table A10 in the appendix shows the organizational charts. Within subjects, we then presented all three ideas to the participants and asked them to read and evaluate each idea. The order of ideas was randomized to prevent positional effects. After the participants had evaluated the third idea, they saw the last idea again and answered questions measuring our mediator variable. Finally, they filled out demographic information.

4.6.5.3 Hierarchy manipulation

Below each idea, we manipulated hierarchical distance by telling the participant "The idea comes from someone at a low / medium / top level in the organizational hierarchy." Further, we graphically highlighted the evaluators' and idea creators' respective level in the same organizational chart (see the example in Table A10 in the appendix).

4.6.5.4 Measures

We measure the dependent variable *Idea selection* by asking participants to assume that they had a corporate budget to invest in new product development and asked them how likely they would spend some of this budget on the idea on a seven-point scale (1 = very unlikely to 7 = very likely). They were asked to make their decision regardless of their level of support for the previous and following ideas.

4.6.5.5 Results

First, we sought to replicate the main effect of our field study. We use linear regression to find whether hierarchical similarity causes more favorable idea evaluation in terms of selection likelihood. Since each individual evaluated three vignettes, we introduce evaluator fixed-effects

and clustered standard errors at the evaluator level. On the vignette level, we control for the evaluated idea, the evaluation order, and the creator's hierarchical level. *Hierarchical similarity* positively and significantly affected *Idea selection* ($F(7, 247) = 6.12$, $b = 0.154$, $p = .036$), fully replicating H1 from the field study.

Next, we sought to unpack whether *Hierarchy-based homophily* is the mechanism that drives our findings. To measure the mechanism, we asked our subjects to provide some more information for the last vignette that they rated. Specifically, we use an adapted scale (see Greenberg & Mollick, 2017) to measure *Hierarchy-based homophily* on a seven-point scale (1 = strongly disagree to 7 = strongly agree) by using three items: "I can put myself in the idea creator's shoes," "The idea creator undergoes similar struggles as I do in the firm," and "The idea creator is representative of my hierarchy level in this firm." We computed a score of hierarchy-based homophily by averaging the three items ($\alpha = .83$).

To test the indirect effect, we use a reduced dataset of 248 observations, since we only had the *Hierarchy-based homophily* measure for the idea rated last. As the idea and the evaluatee's hierarchy level were randomly chosen and varied, we control for both. We applied Hayes's (2018) PROCESS procedure (Model 4) using bootstrapping to test the indirect effects using 5,000 bootstrap iterations. Mediation is present when the 95% confidence interval of the indirect effects excludes 0. In line with this, we find an indirect, significant effect of *Hierarchical similarity* on *Idea selection* via *Hierarchy-based homophily* ($b = 0.260$, $SE = 0.079$, 95% CI [0.122; 0.431]). In sum, these experimental results strongly support our theory that *Hierarchical similarity* affects *Idea selection* via *Hierarchy-based homophily*.

4.7 Toward an Integrated Theory of Perceived Structural Similarity

Our research speaks to the literature investigating how perceived structural similarity[5] between individuals affects their behaviors in the organization. While some find that structural similarity elicits favorable evaluations and behaviors (Hwang et al., 2015; Reitzig & Sorenson, 2013), others find that structural similarity creates conflict (Kilduff et al., 2010; Piezunka et al., 2018a).

We will now propose that this ostensible contradiction is rooted in the multidimensionality of perceived structural similarity. Individuals can perceive structural similarity in different attributes of the organizational structure, such as hierarchical position (this paper), lateral position (e.g., Reitzig & Sorenson, 2013), tenure (e.g., Brennecke, 2020), function (e.g., Bunderson, 2003), or location (e.g., Hwang et al., 2015). The overall perception of structural similarity increases in the degree of similarity on each attribute as well as in the number and the salience of the attributes that individuals share. For instance, two managers in a firm are likely to perceive each other as more structurally similar if they are at the same hierarchy level, in the same unit, in the same function, and the same location, than if they are only at the same hierarchical level.

We suggest that the relationship between perceived structural similarity and favorable evaluation of others may not be linear, but instead take the form of an inverted U – explaining contradictory results in the literature. We propose that this is driven by two competing latent processes: homophily and rivalry. Perceived structural similarity between two individuals will

[5] Our idea of structural similarity relates to but differs from the notion of structural equivalence. Individuals are structurally equivalent in a network if they have the same connections to others and thus occupy the same structural position (Hunter, 2015). Instead of focusing only on objective network positions, we focus on perceived structural similarity – the extent to which individuals perceive themselves as being similar to others in the organization by being similar in relevant attributes of organizational structure.

increase homophily as well as rivalry (Menon & Blount, 2003; Menon, Thompson, & Choi, 2006). Figure 10 (on the left) illustrates both latent mechanisms: the solid line represents the effect of perceived structural similarity in the form of homophilic liking, and the dashed line the effect on rivalry (Block & Grund, 2014). This ties in with recent studies of workplace relationships suggesting that employees may be interconnected simultaneously via positive and negative relationships (Brennecke, 2020; To, Kilduff, & Rosikiewicz, 2020).

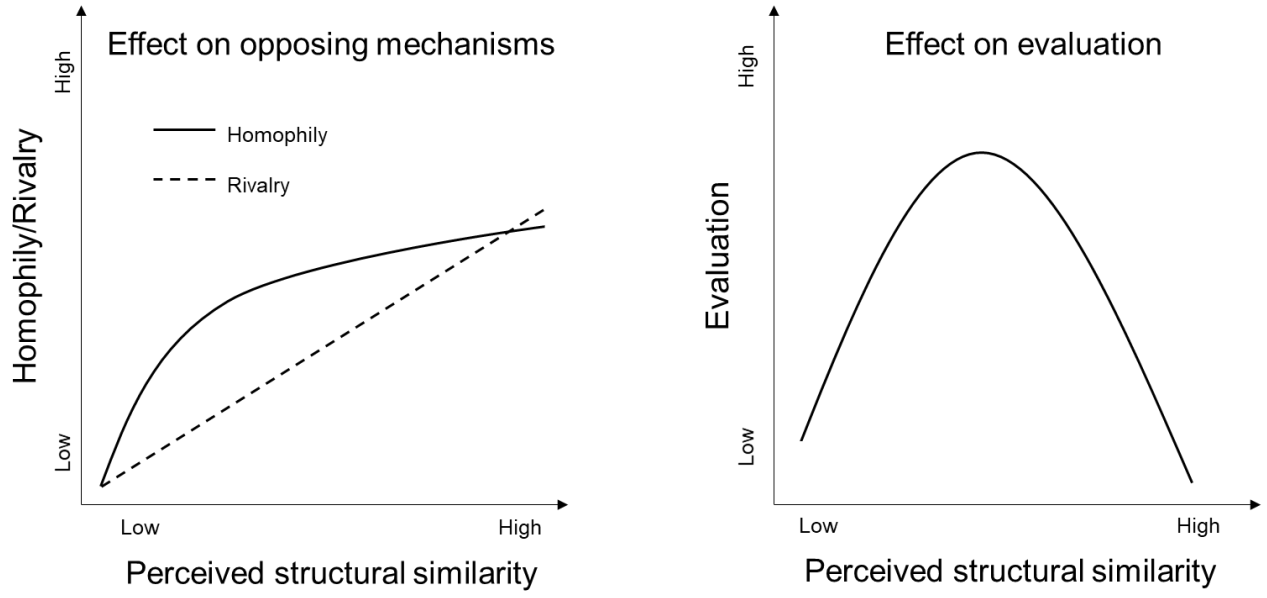

Figure 10 Theorized Effect of Perceived Structural Similarity on Others' Evaluations

We have laid out our arguments in H1 why homophily can be rooted in hierarchy, since individuals who are hierarchically similar face similar challenges and empathize with one another. This logic can be transferred to perceived structural similarity regarding other organizational attributes. Individuals who share structural attributes (e.g., the same unit or the same function) are likely to share a language and thought world (Dougherty, 1992), identify with one another (Reitzig & Sorenson, 2013), and exhibit homophilic tendencies toward one another (Brennecke, 2020). Their degree of perceived structural similarity will not depend on

one dimension only, but on multiple organizational attributes that act as possible bases of homophily and that individuals perceive to be meaningful for comparison.

Since perceived structural similarity grows, so does homophily rooted in structural organizational attributes. However, we suggest that the positive returns from increases in perceived structural similarity diminish as the number and salience of similar organizational attributes increases. The positive effect of increasing perceived structural similarity on liking will be especially pronounced if individuals share only few attributes. Then, additional similarity will lead to a substantial increase in trust and perspective-taking, as individuals move from having little in common to sharing their fate in some organizational group membership. Once some common ground has been built, additional structural similarity increments will be less valuable in increasing trust, perspective-taking, and liking. Thus, increased perceived structural similarity at low similarity levels has a greater impact on liking than at high similarity levels (cf. Montoya & Horton, 2013).

At the same time, perceived structural similarity affects perceived rivalry among individuals within the organization. Rivalry is the relationship "that heightens the subjective stakes of competition." (Kilduff, 2019, p. 776). In competitive environments, similarity causes rivalry and increased social comparison (Garcia et al., 2006; Kilduff et al., 2010). The link between similarity and rivalry has been shown for geographical similarity (Kilduff et al., 2010), status similarity (Kilduff et al., 2010), and personality similarity (Kilduff, 2014). In H2, we transferred this thinking to organizational structure, arguing that structural similarity on multiple organizational attributes (i.e. vertical *and* lateral proximity) may breed rivalry.

Since organizations are ultimately competitive environments, higher perceived structural similarity will engender perceptions of rivalry (Burt, 1987). Similarity on organizational attributes may relate to rivalry for rational reasons, since individuals in similar

positions may compete for scarce resources (Kilduff et al., 2010). Further, similarity may heighten subjective rivalry between individuals, since they feel threatened by the success of close others (Tesser et al., 1988). In turn, increased rivalry leads to increased psychological stakes, which induce more competitive behavior (Pike, Kilduff, & Galinsky, 2018), including devaluing others' knowledge and ideas (Menon et al., 2006).

Taken together, we argue that perceived structural similarity is a common force that creates homophily and liking, but also competition and rivalry. Figure 10 illustrates the joint – subtractive – effect of homophily and rivalry on employees' evaluations of others' performance. At low levels of perceived structural similarity, the marginal homophily benefits outweigh the cost of rivalry; thus, increasing structural similarity positively affect evaluations of others' performance. This is reflected in our finding that hierarchical similarity is associated with favorable idea evaluation as long as the evaluator and evaluatee are not in the same unit. This is also what others have observed for low to intermediate levels of structural similarity, such as the positive relationship between horizontal distance and idea selection (Reitzig & Sorenson, 2013) and the positive relationship between status or location similarity and knowledge-sharing (Hwang et al., 2015).

At high levels of perceived structural similarity, the marginal cost of rivalry outweighs homophily benefits; thus, increases in structural similarity produce a negative net effect on evaluations of others. This is reflected in our findings that the evaluation of others' ideas is less favorable for hierarchically similar individuals who are also in the same business unit. Going in the same direction, Piezunka (2018a) show in the context of Formula 1 drivers, that being

fully structurally equivalent produces "destructive conflict."[6] (Piezunka et al., 2018a). Similarly, Doyle et al. (2016) show that helping others in the organization is less pronounced for others who are very distant (or very close) on a performance-based status measure.

In sum, we expect a curvilinear relationship, where increases in structural similarity have a positive marginal effect on the evaluation of others in the organization until the curve's turning point, and thence a negative marginal effect. This turning point lies at intermediate levels of perceived structural similarity, where the positive effect of the homophily mechanism equals the negative effect of rivalry. This proposed inverted U-shaped relationship is corroborated by our empirical results and may offer a useful integrating perspective on conflicting findings in the literature.

4.8 Discussion and Conclusion

Distributed decision-making types are proliferating in innovation and strategy (Yoo et al., 2012; Yoo, Henfridsson, & Lyytinen, 2010). We have suggested that distributed decision-making systems – which include downward, upward, and peer evaluations – allow for structural homophily, specifically hierarchy-based identification, to translate into decision biases. We find that hierarchical similarity is associated with more favorable idea evaluation; this hierarchical similarity bias is weaker if the evaluator and the ideator are in the same business unit, and stronger if evaluated ideas are more novel.

[6] Structural equivalence is captured as status similarity in terms of whether drivers won over or lost to the same others. Even if this measure incorporates only one dimension, we argue that perceived structural similarity is high throughout, so that our model's left arm is unobservable. Status is by far the most relevant criterion in such hypercompetitive environments. In such settings, rivalry is much more pronounced than in organizational settings.

4.8.1 Theoretical Contributions

We have contributed to the conversation about biases rooted in the organization of innovation (Colombo et al., 2021; Keum & See, 2017), which uncovers idea evaluation biases both in centralized, hierarchical organizational types (Criscuolo et al., 2017; Hegde & Tumlinson, 2014) and in distributed, participative ones (Greenberg & Mollick, 2017; Reitzig & Sorenson, 2013). This research field seeks to explain the conditions in which each organizational form excels, the decision biases produced by each, and the optimal design of decision-making systems.

Our first contribution is to show that distributed decision-making systems, whose key advantages supposedly derive from the absence of hierarchy, are in fact distorted by hierarchy. We show that, in decentralized idea evaluation systems such as internal crowdfunding, biases may stem not only from a lack of formal hierarchical selection power, but – ironically – also from the shadow that hierarchy casts onto such systems. Hierarchy is too pervasive to be easily disregarded, and remains a strong source of identification and behavior in decentralized systems.

Our focus on vertical similarity complements research showing that lateral similarity between evaluators and creators biases evaluations upward (Reitzig & Sorenson, 2013). While fully replicating Reitzig and Sorenson's finding of preference for ideas from the same business unit, we extend their finding by showing how structural similarity along several dimensions biases decision-making, arguing that the shape of the bias depends on the overall perceived degree of structural similarity.

Second, we contribute to the literature by relating homophily to attributes of organizational structure, explaining *how* and *why* hierarchical similarity distorts distributed idea evaluation. Specifically, we put forward hierarchy-based homophily as the underlying process

that leads evaluators to overvalue ideas of hierarchically similar others. Hierarchy-based homophily represents a source of identification: it elicits feelings of liking and 'sharing the same fate' among hierarchical peers, which are founded on the assumption of similar roles, pressures, and career trajectories in the organization. With growing hierarchical distance, homophilic preferences rooted in mutual identification and shared problems decline and turn into downward scorn and upward envy (Fiske, 2010). Our empirical field study allows us to identify this mechanism as the likely source of the bias, confirming that it is structural (based only on hierarchy cues) rather than informational or relational; our experiment supports this notion. Based on the insight that hierarchical structure sometimes leads to over- or undervaluation of others' ideas via homophily, we move on to theorize how perceived structural similarity across multiple shared structural attributes affects the evaluations of fellow members of the organization. We offer an integrated theory that suggests a curvilinear relationship between perceived structural similarity and favorable evaluations of others, since homophily and rivalry are counteracting processes. Individuals evaluate others most favorably at intermediate levels of structural similarity. Thus, we have reconciled the opposing results on structural similarity's effect on interpersonal outcomes (Kilduff et al., 2010; Piezunka et al., 2018a). This speaks to research calling for investigations of when organizational position similarity turns into competition (Reitzig & Sorenson, 2013) or turf wars (Criscuolo et al., 2017).

Third, concerning our second moderator, we investigated the interplay between structural similarity biases and novelty (see also Criscuolo et al., 2017), showing an amplifying effect. Past research found that the reliance on social evaluation depends on the quality of the artifact under evaluation: social evaluation is especially pronounced if the assumed *artifact quality* is low (Hegde & Tumlinson, 2014). Controlling for idea quality, we found that social

evaluation also depends on *artifact novelty*, proposing uncertainty as the mechanism: greater idea novelty increases evaluation uncertainty (cf. Mueller et al., 2012), which makes the evaluation's social context more salient. Our insights bound the usefulness of distributed decision-making and indicate when hierarchical decision-making by experts may be more efficient.

4.8.2 Managerial Implications

We have presented some results that practitioners may find surprising or even counterintuitive, and that offer guidance on the design of distributed idea evaluation systems. First, a key reason for companies to introduce distributed systems is to curb overly rigid hierarchy-based idea evaluation (Hamel & Zanini, 2016; Kastelle, 2013). However, we found that hierarchy reaches into such 'democratized' decision systems. Even if such systems are free from formal hierarchical authority, they are not hierarchy-free. Notably, hierarchy produces biases in *both* – albeit different – system types that need to be weighed against each other.

Second, managers should understand that distributed decision-making is particularly biased against very novel ideas. This goes against the expectation that distributed decision-making systems are better able to deal with breakthrough ideas that don't fit established evaluation criteria (cf. Bernstein et al., 2016; Romme, 2015). Our results suggest that particular care is needed to maintain unbiased evaluation in the distributed selection of highly novel ideas.

Third, managers are used to seeing hierarchy as a source of rivalry that can distort decision-making against hierarchical peers. We have highlighted that hierarchical similarity can also have the opposite effect: it can elicit identification among hierarchical peers that engenders favoritism. We advise that managers be aware of these countervailing biases among their staff if they are to make efficient decisions.

Overall, our insights strengthen calls for the careful design of distributed decision systems (see Birkinshaw, 2017; Stieger, Matzler, Chatterjee, & Ladstaetter-Fussenegger, 2012). Awareness of potential distortions enables better decision system design and – ultimately – better decisions. For instance, firms may consider anonymizing idea proposals to overcome the homophily-based hierarchical similarity bias and other biases relating to ideators' characteristics. This comes at the cost of reducing the motivation to participate. In our interviews, ideators explained how they were motivated by the expectation that their superiors see their efforts in developing ideas and competing for funding. Thus, to reduce biases while maintaining ideators' motivation, it may be advisable to anonymize ideators during the contest but to reveal their names directly thereafter.

4.8.3 Limitations and Future Research

Our study has limitations, which also open avenues for future research. First, we cannot be certain how carefully the evaluators screened the ideas on the crowdfunding platform and sought to identify the best ones. To develop a better understanding of evaluators' considerations and motivations for their investment decisions, we interviewed 22 evaluators after the crowdfunding initiative. These suggested that the evaluators diligently endeavored to identify the best ideas: they reported among others that they had "tried to really understand what the different projects are about" and had examined "the project plan, how [ideators] wanted to achieve it, whether it would make sense, whether it is reasonable, whether they could deliver according to the plan."

Second, we investigated only one organization, a fairly hierarchical European manufacturing company. This could affect our findings' generalizability. On the one hand, in less hierarchically structured firms, it may be easier for employees to overcome biases rooted in organizational structure. On the other hand, it is remarkable that we found *hierarchical*

similarity to *positively* affect idea evaluation despite the fact that the organization is so strongly hierarchical.

Third, we have focused on how similarity in an *achieved* dimension of homophily (i.e. formal hierarchy in the organization) affected idea evaluation and selection. Future research could investigate whether *ascribed* dimensions of hierarchy (e.g., organizational members' social class) (Martin & Côté, 2019) affect idea evaluation, potentially in combination with formal hierarchy (see also Ertug et al., 2022).

Finally, our empirical research focused on hierarchical similarity as a source of bias in distributed decision-making. It would be interesting to investigate whether the same bias exists in centralized, hierarchical decision systems. Even if, in such systems, employees are not formally responsible for selecting ideas of peers or superiors, they are often called on to provide feedback on others' ideas. We would expect that structural similarity biases also affect such settings, for instance as individuals experience hierarchy-based homophily, which leads them to be generous to their peers. At the same time, this bias may take different shapes depending on the motivations and incentives that are present, the degree of competition (see H2), and the accountability level for the support that is given or withheld.

5 The Effect of Framing on Distributed Decision-Making: Evidence from a Field Experiment in Idea Evaluation

Distributed decision-making enables firms to include employees and other stakeholders in the evaluation of new ideas. In this paper, we argue that framing the distributed decision-making task can be a powerful tool to steer evaluation outcomes. We investigate whether framing decision-makers in terms of benefitting different targets can change the outcome of the idea evaluation process in terms of the number of selected ideas, their novelty, and strategic fit. We conduct a field experiment in a natural setting, where a firm uses internal crowdfunding to generate and select ideas. We randomly allocated decision-makers to one of three intervention groups (organizational (treatment 1) vs. peer (treatment 2) vs. control). We find significant differences between these groups in how they evaluate ideas in terms of quality and quantity of ideas supported. Specifically, we find that decision-makers support fewer ideas when the goal of an idea evaluation task is framed towards the organization than when the goal of an idea evaluation task is framed towards peers. They also support ideas with a higher strategic fit and lower novelty when framed toward the organization. We contribute to the literatures on distributed decision-making and idea evaluation, for example, by investigating framing as a promising instrument for managerial control of distributed decision-making and idea evaluation.

Keywords: idea evaluation, idea selection, crowdfunding, randomized-control trial.

5.1 Introduction

The adoption of digital technologies has begun to drive fundamental changes in how decision-making is organized in companies (Nambisan et al., 2017; Yoo et al., 2012) and has resulted in a trend from centralized toward decentralized decision-making. In the innovation context, firms have started democratizing idea selection, opening idea selection to stakeholders (Birkinshaw, 2017; King & Lakhani, 2013; Reitzig, 2011; Reitzig & Sorenson, 2013), and opening up idea evaluation to employees via distributed idea evaluation (Reitzig & Sorenson, 2013), prediction markets (Soukhoroukova et al., 2012), and internal crowdsourcing (Malhotra et al., 2017). Firms try to capture some of the associated benefits through their distributed decision-making activities. Examples are the possible integration of many stakeholders' perspectives (Weiser et al., 2020), advantages of division of work (Raveendran et al., 2021), improved speed and quality of decisions (Yukl & Fu, 1999), and increased employee motivation and enhanced efficiency (Gambardella et al., 2020). Furthermore, distributed decision-making has the potential to reduce overloads for managers (Yukl & Fu, 1999).

However, the delegation of decision-making authority may also come at the cost of losing control (e.g., Aghion & Tirole, 1997). This raises the question of how firms can capture the benefits of delegating decision-making authority without losing control (e.g., Markides, 2022).

Practitioners and scholars have developed a range of tools to mitigate agency problems. For example, to motivate desirable employee behavior, research has investigated instruments such as monetary incentives and compensation (e.g., Gneezy et al., 2011), awards (e.g., Gallus & Frey, 2016), and social rewards and recognition (e.g., Gallus et al., 2020). However, the use of these instruments is especially difficult in distributed decision-making. One reason firms use the delegation of decision rights is to harness the positive motivational effects of autonomy

(Gambardella et al., 2020). The use of financial instruments may be counterproductive since it can crowd out intrinsic motivation (Gneezy et al., 2011) and is of limited value in promoting the autonomous motivation (Stone et al., 2009) needed for distributed decision-making. Furthermore, if firms delegate decision-authority to front-line employees to profit from their informational advantages (e.g., from their tacit customer need knowledge, etc.), it is not always feasible to use instruments that require the ex-ante definition of the desired behavior to measure against. Instruments such as awards may also be unviable if the efforts of employees are difficult to observe, and the value of their outputs is unknown or can only be observed with a time lag (Gambardella et al., 2015).

This paper suggests a different influencing factor to shape outcomes in distributed-decision making – the framing of the distributed decision-making task itself. A growing body of research in innovation and entrepreneurship studies framing (e.g., Clarke, Cornelissen, & Healey, 2019; Falchetti et al., 2021; Giorgi & Weber, 2015). We introduce framing as an instrument for managerial control of distributed decision-making.

One evident way to frame the distributed decision-making task is to focus on the goals of the central organization or the goals of the involved actors (specifically the idea creators). After all, the shift from the organization-centric to the human-centric perspective on decision-making is important to effectively manage decentralized or flatter organizations (Bernstein, 2022). We study whether and how the framing of the distributed decision-making task affects distributed decision-making outcomes with regard to furthering organizational goals vs. peer goals.

We draw upon goal-framing theory (Lindenberg, 2003, 2006a, 2006b, 2008; Lindenberg & Foss, 2011), which offers a framework to understand how the goal-framing of a distributed decision-making task shapes the underlying cognitive processes of the decision-makers.

Specifically, we investigate whether the evaluation outcomes in terms of the quality and quantity of selected ideas change depending on whether evaluators are framed to take an organizational, peer, or neutral focus in the idea evaluation process.

To answer our research question, we conduct a field experiment in a distributed decision-making setting, in which Siemens uses internal crowdfunding to generate and select ideas. During the idea generation phase, all 7,800 Siemens' technology department employees were invited to submit ideas. Subsequently, 500 voluntary employees, from which 343 participated in our experiment, evaluated 112 ideas by allocating a total budget of 827,000 Euros to one or more ideas. Idea creators whose ideas were supported (i.e., reached their funding goal) used the budget to implement the idea. We randomly allocated evaluators to one of three intervention groups (organizational, peer, and control).

We find that framing the distributed decision-making tasks changes the quality and quantity of ideas selected by decision-makers in an idea evaluation task. Specifically, decision-makers support fewer ideas when the goal of an idea evaluation task is framed towards the organization than when the goal of an idea evaluation task is framed towards peers. They also support ideas with a higher strategic fit when the goal of the idea evaluation task is framed towards the organization. Furthermore, decision-makers support ideas with higher novelty when the goal of an idea evaluation task is framed towards peers than when the goal of an idea evaluation task is framed towards the organization.

Beyond the practical implications, our work makes several important contributions to research on distributed decision-making and idea evaluation. First, our work shows that framing the distributed decision-making task can, in fact, shape decision outcomes, and framing can be a powerful tool in distributed decision-making. We introduce framing as a promising instrument for managerial control of distributed decision-making. Additionally, our research contributes to

knowledge in the field of idea evaluation. Prior research has investigated how the idea (e.g., Kornish & Ulrich, 2011), the ideator (e.g., Fuchs et al., 2019), the evaluator (e.g., Berg, 2016), the ideator-evaluator relationship (e.g., Reitzig & Sorenson, 2013), and the context (e.g., Keum & See, 2017), affect idea selection and evaluation. Our work complements the last group of papers that analyzed the role of context in shaping the evaluation of ideas by introducing the framing of the task as a contextual factor shaping idea evaluation processes.

5.2 Background

5.2.1 Centralized vs. Distributed Decision-Making in Organizations

The widespread adoption of digital technologies in firms influences how decision-making in companies is organized (Nambisan et al., 2017; Yoo et al., 2012). Firms try to capture some of the associated benefits through their distributed decision-making activities. These benefits are, for example, the possible integration of many stakeholders' perspectives (Weiser et al., 2020), advantages of division of work (Raveendran et al., 2021), improved speed and quality of decisions (Yukl & Fu, 1999), and increased employee motivation and enhanced efficiency (Gambardella et al., 2020). Furthermore, distributed decision-making has the potential to reduce overloads for managers (Yukl & Fu, 1999).

Practitioners and scholars have examined a range of tools to mitigate agency problems. For example, research has investigated instruments such as monetary incentives and compensation (e.g., Gneezy et al., 2011), awards (e.g., Gallus & Frey, 2016), as well as social rewards, e.g., recognition (e.g., Gallus et al., 2020) as a motivation of desirable employee behavior.

However, the use of these instruments is especially difficult in distributed decision-making. One reason firms use the delegation of decision rights is to harness the positive motivational effects of employee autonomy (Gambardella et al., 2020). The use of financial

instruments may be counterproductive since it can crowd out intrinsic motivations (Gneezy et al., 2011) and is of limited value in promoting the autonomous motivation (Stone et al., 2009) needed for distributed decision-making. Newer research also points toward the importance of incentivizing employees in congruency with the relation that they hold with the incentivizer (Gallus, Reiff, Kamenica, & Fiske, 2022). Thus, compared to centralized decision-making, the task of properly incentivizing becomes even more difficult due to the higher number of decision-makers involved.

Moreover, if firms delegate decision-authority to front-line employees to profit from their informational advantages (e.g., from their tacit customer need knowledge, etc.), it is not always feasible to use instruments that require the ex-ante definition of desired behavior to measure against. Furthermore, instruments such as awards may also be unviable if the efforts of employees are difficult to observe, and the value of their outputs is unknown or can only be observed with a time lag (Gambardella et al., 2015).

While decentralized decision-making benefits from the specific knowledge of lower-level employees, it may lack greater alignment with organizations' objectives of centralized decision-making processes (Hutchison-Krupat & Kavadias, 2015). Properly aligning firm objectives with employee behavior by using incentives may be especially difficult for distributed decision-making in the critical "fuzzy-front-end of innovation", which is characterized by uncertainty and lack of formal processes (Barczak, Griffin, & Kahn, 2009). Focusing on distributed innovation, Yoo and colleagues (2012, p. 1402) argue that the notion of incentives "may come to be understood as less of a structural feature of the organization and as more of an adaptive emergent coordination mechanism."

We investigate a different promising influencing factor – the framing of the distributed decision-making task itself. We introduce framing as an instrument for managerial control of

distributed decision-making, essentially answering the call for research on how dispersed work can be controlled and managed (Cardinal, Kreutzer, & Miller, 2017).

5.2.2 Distributed Idea Evaluation

Selecting which ideas to implement and which ideas to reject is an essential step in the innovation process (Perry-Smith & Mannucci, 2017). Adopting distributed idea evaluation mechanisms, such as internal crowdfunding, enables shifts in decision-making from centralized to distributed decision-making, opening idea evaluation that is otherwise limited to top management or specialists to employees throughout an organization. Internal crowdfunding can be seen as part of a general trend toward decentralized decision-making, democratizing idea selection and opening it to stakeholders (Birkinshaw, 2017; King & Lakhani, 2013; Reitzig, 2011; Reitzig & Sorenson, 2013; Riedl, Blohm, Leimeister, & Krcmar, 2013).

Distributed forms of decision-making put employees in the position of idea evaluator. Depending on whether they focus on furthering organizational goals or peer goals, they will make different decisions, thus promoting or rejecting different ideas. This nexus has never been studied, even though it is essential for the functioning of distributed decision-making and the democratization of idea selection. Organizations need evidence-based recommendations on how to shape behavior, focusing on specific targets in distributed idea evaluation. Especially in the fuzzy front-end of innovation, where ideas still have to pass through various stages of evaluation and gather acceptance from different groups within the firm (such as managers and other colleagues), focusing on the goals of peers or of the organization is likely to lead to different outcomes of the idea evaluation task.

Prior research has investigated how factors such as the idea (e.g., Kornish & Ulrich, 2014), the ideator (e.g., Fuchs et al., 2019), the evaluator (e.g., Berg, 2016), the ideator-evaluator relationship (e.g., Reitzig & Sorenson, 2013), and the context (e.g., Keum & See,

2017), affect idea selection and evaluation. Research in the last group has studied the role of context in shaping the evaluation of ideas but has only begun to investigate distributed evaluation (Colombo et al., 2021; Keum & See, 2017; Reitzig & Sorenson, 2013). Very few papers have studied the framing of the idea evaluation task itself. While existing research has looked at how evaluation scores were affected if raters were told that the ideas were generated to achieve a gain or avoid a loss (i.e., a gain goal-framing or a loss goal-framing) (Zhou, Wang, Song, & Wu, 2017) or how novel ideas were framed (Falchetti et al., 2021), it has not investigated whether the framing of the *task* itself affects the evaluation process.

5.3 Hypothesis Development

We suggest that the goals of the distributed decision-making task can frame the underlying cognitive processes of the decision-makers in the decision-making task and focus the evaluation on benefiting the intended target. Goal-framing theory (Lindenberg, 2003, 2006a, 2006b, 2008; Lindenberg & Foss, 2011) provides the theoretical basis for this relationship. According to goal-framing theory, in order to influence behavior and cognition, goals need to be activated in the mind of an individual by situational cues (Lindenberg, 2013). The active goals then influence cognitive processes. For example, they influence how salient and how readily available goal-relevant information is and which alternatives are perceived (e.g., Förster, Liberman, & Higgins, 2005; Lindenberg & Frey, 1993) . Depending on whether these alternatives are detrimental or conducive to the active goal, the alternatives are assigned negative or positive values (Förster, Liberman, & Friedman, 2007; Kruglanski & Köpetz, 2009; Shah, Friedman, & Kruglanski, 2002), which influences the ranking of alternatives. The activation of a focal goal also inhibits the accessibility of alternative goals (Shah et al., 2002). Interestingly, even unconsciously triggered goals have been shown to guide action (see, e.g., Ferguson & Bargh, 2004). Decision-makers can, of course, be motivated by a multitude of

goals. Normative goals for a distributed decision-making task can be directed at various targets (i.e., different entities such as groups, collectives, or organizations that an individual can be oriented toward Lindenberg & Foss, 2011).

5.3.1 Hypotheses

5.3.1.1 Hypothesis 1: Task Framing and Idea Quantity

We will now theorize how organizational versus peer framing affects employees' idea evaluation behavior in firms in terms of the quantity and quality of ideas.

First, we argue that organizational framing leads to fewer ideas selected than peer framing. Consider the case of decision-makers in an idea evaluation task with multiple ideas and the possibility of controlling a certain budget for funding ideas. Under budgetary constraints, they can only select a small subset of ideas for further implementation. Nonetheless, they can allocate their entire budget to one idea or spread it amongst several ideas. If they are asked to help the organization implement its best ideas and if a normative goal frame towards the organization is elicited, they will shift their cognition and motivation towards evaluating behavior that furthers the organization's goals. They will judge the idea using norms, rules, and knowledge of the target domain (Csikszentmihalyi, 2007) - in this case, the organizational criteria. The alternatives are then evaluated, and a selection is made according to their perception of the quality distribution of alternatives.

In comparison to the orientation towards peers, decision-makers oriented toward organizational goals should select and allocate their budget to the ideas with the highest potential and therefore select fewer ideas on average. In contrast, if a normative goal frame towards peers is active, they focus their evaluation and selection on acting appropriately toward their peers. Drawing upon a different mental model of expectations and norms with regard to their peers (Lindenberg, 2006b), the focus on organizational criteria may be reduced and

superseded by social criteria (e.g., sharing of resources, fairness, etc.). Therefore, decision-makers in the normative goal frame towards peers will share the resources on average with more ideas.

H1: *Decision-makers support fewer ideas when the goal of an idea evaluation task is framed towards the organization than when the goal of an idea evaluation task is framed towards peers.*

5.3.1.2 Hypothesis 2: Task Framing and Idea Quality (Novelty)

We will now discuss how the organization versus peer framing of the distributed decision in idea evaluation affects the quality characteristics of the selected ideas, specifically the novelty of an idea. It has been recognized for a long time that what is considered useful or novel varies with the context (Csikszentmihalyi, 2007) and that novelty recognition is known to vary by task, context, and evaluator (Zhou et al., 2017).

Framing the goal of the decision-making task towards the organization will elicit different idea evaluation outcomes than a framing towards peers. Suppose a normative goal frame toward the organization is activated. In that case, decision-makers will shift their cognition and motivation towards evaluation behavior that furthers the organization's goals by employing organizational criteria to appraise the ideas. More creative or novel ideas are associated with uncertainty, which can lead to a bias against them relative to more practical ideas (Mueller et al., 2012). Since the commercial success of novel ideas is ex-ante unknown, and since novel ideas might require organizations to re-organize and develop new routines (Criscuolo et al., 2017; Rindova & Petkova, 2007), overly novel ideas may diverge from agreed-upon organizational criteria. Compared to peer framing, decision-makers framed toward the organization's goals reduce their preference for novelty. They will prefer ideas with more predictable outcomes, which, e.g., can be evaluated according to existing organizational criteria and developed in standard organizational routines.

In contrast, framing toward peers lessens the focus on organizational dependencies and organizational criteria, thus allowing decision-makers to embrace more novelty. We theorize that the framing toward peers can increase the preference for novelty. Related research has shown that evaluation can be biased if decision-makers share the same department or facility (Reitzig & Sorenson, 2013). Others have theorized that organizational proximity can increase the preference for novelty because decision-makers overestimate the benefits and discount the costs of projects (Criscuolo et al., 2017). The focus on peer goals and a feeling of shared social identity elicited through a framing toward peers will lessen the focus on organizational criteria and thus increase the preference for novelty. We, therefore, propose that:

H2: *Decision-makers support ideas with higher novelty when the goal of an idea evaluation task is framed towards peers than when the goal of an idea evaluation task is framed towards the organization.*

5.3.1.3 Hypothesis 3: Task Framing and Idea Quality (Strategic Fit)

Another important quality dimension of ideas in a distributed idea evaluation task is strategic fit (Dziallas, 2020). Since the value-creating potential of ideas is difficult to assess ex-ante (e.g., Kornish & Ulrich, 2014), and perceptions of value can differ considerably between stakeholders within the organization (George, 2007), similar to idea novelty, the context determines the strategic fit of an idea.

We will now investigate how the organization versus peer framing of the distributed decision-making task affects the strategic fit of selected ideas. We argue that activating a normative goal frame toward the organization will lead to the selection of ideas with greater strategic fits due to an increased focus on a business perspective compared to peer framing. In a study with idea evaluation experts, it was shown that the business perspective is emphasized through the integration of evaluations of profitability and strategic fit during intuitive idea

assessments (Magnusson et al., 2014). Recent research also shows that expert evaluators can systematically contextualize ideas concerning the perspectives of different groups (e.g., end customers, internal users, organization), even if not explicitly asked to do so (Sukhov et al., 2021). The activation of a normative goal frame toward the organization will increase the focus on the strategic fit of ideas, while the activation of a normative goal frame toward peers will lessen this focus.

H3: *Decision-makers support ideas with a higher strategic fit when the goal of the idea evaluation task is framed towards the organization than when the goal of an idea evaluation task is framed toward peers.*

5.4 Research Design

5.4.1 Research Setting: Company Background

We designed our field experiment in the context of the internal crowdfunding initiative of Siemens, one of the largest multinational industrial manufacturing firms worldwide. The crowdfunding initiative comprised an ideation phase and an investment phase. First, in the five-week-long ideation phase, any employee from the technology department could submit one or more project ideas to an internal online platform.

Project proposals included the targeted funding sum, information on the deliverables, tasks, and milestones, the submitter's name and department. There was no restriction on the project topics, and ideas were not vetted before entering the initiative. The idea suggestions could be viewed, liked, and discussed by every company employee but not evaluated during the ideation phase. Eighty-five idea creators submitted 112 project proposals.

Next, in the decision-making phase, which took place between April 19 and April 20, 2018, and followed immediately after the ideation phase, employees who had applied to be investors were able to invest in the project proposals. Since more employees applied than the

investor spots that were available, decision-maker spots were determined through a lottery. Each decision-maker received a personal budget of €2,200 that could be allocated freely among the 112 ideas in €1 increments. Once a decision-maker had invested, the investment could not be withdrawn. The decision-makers were anonymous throughout the process for everyone but the platform manager. We later obtained investment data from the platform manager. The beginning of the decision-making phase was announced to all investors in a series of emails that contained our experimental intervention.

The nature of the internal crowdfunding initiative in this organizational context made it especially advantageous for our theoretical investigation since the context was free of other common organizational ways of directing employee behavior. Investment behavior was voluntary, decoupled from financial or reputational incentives, and concealed from the scrutiny of management or peers through anonymity. Furthermore, the measured behavior was not distorted through different job requirements or performance goals since participation in the internal crowdfunding initiative was outside of the normal role of employees. We designed the field experiment to interfere minimally with the typical process of the existing initiative. We worked closely with the platform managers to embed our study in the regular communication of the initiative. This context furthermore allowed us to introduce our experimental interventions without participants being aware that they were part of a study, ensuring that subjects naturally undertook the tasks in our natural field experiment (Levitt & List, 2009).

5.4.2 Experimental Protocol and Treatments

Each decision-maker received the intervention twice via email (in the notification email stating that they were selected as a decision-maker and in the email invitation to start investing, which also contained the link to the platform).

In the control treatment, the notification email was phrased as follows:

> "Dear X,
>
> Congratulations! You have been selected as an investor and given EUR 2,200 that you can now freely distribute to the idea(s) of your choice. <**Help to implement the best ideas!**>
>
> Here are the rules again:
>
> [...]
>
> **<Help to implement the best ideas>!**
>
> …."

In the organizational treatment, explicit organizational framing was introduced by replacing the sentence "Help to implement the best ideas!" with the following: "Help Siemens implement its best ideas!". In the peer treatment, the sentence was replaced by: "Help your colleagues implement their best ideas!". Both treatments phrased the rest of the email the same as in the control.

The second email contained the information that the decision-makers could start investing and repeated the respective treatment. It also contained a link to the platform ("Dear X, the investment phase of Quickstarter has begun! Use your chance to: **<Treatment>**! …"). This was to ensure that decision-makers would read the designated treatment at least once before starting to invest. All emails were delivered from the initiative's official email platform.

5.4.3 Randomization and Randomization Checks

Decision-makers were randomly assigned to treatments using pseudo-random number generators.

A total of 383 decision-makers participated in the idea evaluation task and entered our experiment. We limited our estimation sample to the 342 decision-makers working for the core

organization rather than the acquired or stand-alone legal subsidiaries; this was to ensure that participants had similar reference points for the peer and the organization treatment.

Since participation in the crowdfunding initiative was voluntary, we investigated whether our treatments affected the likelihood of participation in the idea evaluation task by running a logistic regression with our treatments and a binary dummy variable indicating whether a decision-maker had participated in the initiative after receiving the invitation email. The overall model fit was not significant.

To confirm the validity of the randomization, we checked for differences in observable decision-makers' characteristics across treatments (see Table B12 in the appendix). Notably, our sample appears to be roughly balanced across treatments, supporting the validity of our randomization.

5.4.4 Dependent Variables

Our first dependent variable is *Number of ideas invested*, which captures the number of ideas a decision-maker supported with money from their budget.

To measure our second dependent variable *idea novelty*[7], we employed the consensual assessment technique (Amabile, 1982) with a panel of five experts from our partner firm. All experts had considerable technical experience and, at the time, were appointed to positions that involved the selection of innovative ideas (e.g., portfolio managers or managers of organizational units cooperating with startups). The experts had not participated in the crowdfunding initiative and were not aware of its outcomes. After randomization of the order and anonymization of the ideas, the experts independently rated the ideas on a 7-point Likert scale (1– "not novel" at all to 7 – "very novel"). The instructions read, "Please rate the novelty,

[7] We used R's irrNA package (Brückl, Heuer, 2022) to calculate ICC estimates and their 95% confidence intervals (C,k): 0.98 CI [0.95; 0.99]

i.e., the uniqueness and originality, of the idea described." (Dean, Hender, Rodgers, & Santanen, 2006; Riedl et al., 2013, 2010). *Idea novelty* for each idea is computed using the average rating of at least two experts.

For our third dependent variable, *strategic fit*, we averaged the measured content similarity between the ideas an investor chose and a 74-page textual publication of the current strategy of the partner firm. To do so, we stemmed the texts using the quanteda R package. We removed punctuation, numbers, and common stop words and converted all words into lowercase. After a transformation into word vectors, we calculated the cosine similarity between each idea and the strategy publication, employing a weighting strategy emphasizing unique words (for the process that we followed, see Piezunka & Dahlander, 2015). Table 7 lists the variables. The descriptive statistics can be found in Table 8. Our findings are summarized in Table 9.

Table 7 Descriptions of the Variables

Variable name	Explanation
Number of ideas invested	Number of ideas a decision-maker selected
Idea novelty	Average novelty rating of the ideas a decision-maker selected
Strategic fit	The average content distance between the selected ideas and the current strategy publication, calculated employing cosine similarity
Ideas in the pot	Number of ideas available for investment at the time of a decision-maker's investment

,

Table 8 Correlation Table

	Novelty	Strategic fit	Number of ideas invested	Treatment
Novelty	1			
Strategic fit	-0.329***	1		
Number of ideas invested	-0.0112	-0.104	1	
Treatment	-0.104	-0.0269	0.0301	1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 9 Regression Models

	(1) Number of ideas invested	(2) Number of ideas invested	(3) Novelty	(4) Novelty	(5) Strategic fit	(6) Strategic fit
Peer	-0.0554	-0.0441	0.160*	0.164*	0.00257	0.00148
	(-0.49)	(-0.39)	(2.66)	(2.68)	(0.92)	(0.58)
Organizational	-0.271**	-0.259**	0.0472	0.0521	0.00925**	0.00804**
	(-3.20)	(-3.29)	(0.89)	(0.91)	(4.02)	(3.74)
Ideas in pot		0.00768*		0.00306		-0.000749***
		(2.31)		(1.00)		(-5.23)
Constant	1.076***	0.326	4.409***	4.110***	0.146***	0.219***
	(23.50)	(1.01)	(66.69)	(12.54)	(29.94)	(12.94)
Observations	342	342	342	342	342	342
Adjusted R^2			0.006	0.004	0.003	0.020
Log pseudolikelihood	-706.57732	-705.00381				

t statistics in parentheses - Standard errors are clustered by affiliation to business units.

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

5.5 Findings

We will now examine how organization versus peer framing affects employees' idea evaluation behaviors in firms in terms of the quantity and quality of ideas.

5.5.1 H1: Task Framing and Idea Quantity (Number of Ideas)

To test our first hypothesis, we ran a Poisson regression with the *Number of ideas invested* as the dependent variable. We chose Poisson over linear regression because the dependent variable is a count variable and can only take on non-negative integer values. In Table 9 in Model 1, we included dummies for our treatments. In Model 2, we included a control for the number of ideas a decision-maker could evaluate at the point in time they made an investment (*Ideas in the pot*). Once an idea reached its funding goal in the crowdfunding initiative, it was not possible to invest in the idea anymore.

Both models show that compared to the peer treatment (b = -0.214; t = -2.70; p = .007) and the control treatment (b = -0.259; t = -3.29; p = .001), the organizational treatment has a negative and significant effect on the *Number of ideas selected*. The incidence rate ratio for the organizational treatment is ($e^b = e^{-0.259} = 0.771$), indicating that *Number of ideas invested* is reduced by around 23% compared to the control treatment. There is no significant difference between the control and peer treatments. Inclusion of our control variable *Ideas in the pot* (b = 0.00768; t = 2.31; p = 0.021) does not change the direction or significance of the results. Our results hold if we rerun our model in a negative binomial regression. These findings support H1.

5.5.2 H2: Task Framing and Idea Quality (Novelty)

Besides the question of how organization versus peer framing affects employees' idea evaluation behaviors in firms in terms of quantity, we were also interested in the quality of ideas. We, therefore, also examined whether our treatments influenced the novelty of the ideas

a decision-maker chooses. To test our second hypothesis, H2, we ran a linear regression with *Novelty* as the dependent variable (Table 9, Models 3 – 4). We observed that decision-makers in the peer treatment chose ideas that are significantly more novel compared to decision-makers in the control group (b = 0.160, t = 2.66, p = .019) and the organizational group (b = 0.112, t = 2.82, p = .014). The results remain stable if we control for *Ideas in the pot*. In sum, these findings provide support for H2.

5.5.3 H3: Task Framing and Idea Quality (Strategic Fit)

To test H3, we investigated whether our treatments influenced the strategic fit of ideas a decision-maker chose. We used linear regression with *Strategic fit* as the dependent variable. As shown in Model 5 in Table 9, the relationship between the organizational treatment and S*trategic fit* is positive and significant (b = 0.00925, t = 4.02, p = 0.001) compared to the control group. Organizational treatment also results in a significantly higher strategic fit compared to the peer treatment (b = 0.00668, t = 2.17, p = 0.048). We found support consistent with our expectations for H3.

5.6 Discussion and Conclusion

5.6.1 Theoretical Contribution

Distributed decision-making has important advantages for firms (e.g., Gambardella et al., 2020; Raveendran et al., 2021; Weiser et al., 2020; Yukl & Fu, 1999). However, the delegation of decision-making authority may also come at the cost of losing control (e.g., Aghion & Tirole, 1997). This raises the question of how firms can capture the benefits of delegating decision-making authority without losing control (e.g., Markides, 2022). Due to the nature of distributed decision-making, not all traditional instruments to influence employee behavior are suitable. We investigated framing as a promising instrument for managerial control of distributed decision-making.

We have drawn on goal-framing theory to investigate how different framings of the distributed decision-making task (organization, peer, control) produce different outcomes. By conducting a field experiment in the context of an internal crowdfunding initiative, we examined the causal effects of different framings: the framing of the distributed decision-making task, in fact, alters the behavior. We show that framing the distributed decision-making tasks changes the quality and quantity of ideas selected by decision-makers in an idea evaluation task. Specifically, we find that decision-makers support fewer ideas when the goal of an idea evaluation task is framed towards the organization than when the goal of an idea evaluation task is framed towards peers. They also support ideas with a higher strategic fit when the goal of the idea evaluation task is framed towards the organization. Furthermore, decision-makers support ideas with higher novelty when the goal of an idea evaluation task is framed towards peers than when the goal of an idea evaluation task is framed towards the organization.

Our work makes several important contributions to research on distributed decision-making and idea evaluation. First, our work shows that framing the distributed decision-making task can, in fact, shape decision outcomes, and framing can be a powerful tool in distributed decision-making. In our field experiment, even subtle changes in the framing of the distributed decision-making task influenced outcomes significantly. One of the reasons for delegating decision-making authority is the idea that employees from all levels of the hierarchy have valuable knowledge (e.g., knowledge about consumer needs, technologies, and product opportunities) that can help the organization reach its goals (Dessein, 2002). Framing allows a firm to capture these benefits by focusing the task on the goals for the specific initiative. Employees will translate the goals into criteria and move towards the goal as they see fit based on their various knowledge sets.

Furthermore, unlike other instruments to control the outcome of distributed decision-making, framing the distributed decision task can be delivered before a distributed decision-making task is started. It also does not depend on specifying desired outcomes to measure against or wait for outcomes that only manifest with a time lag (Gambardella et al., 2015). By introducing framing as an instrument for managerial control of distributed decision-making, we also answer the call for research on how dispersed work can be controlled and managed (Cardinal et al., 2017).

Secondly, our research contributes to the literature on distributed vs. non-distributed systems. We show that an organizational framing can potentially counteract problems with loss of control in distributed decision-making (Aghion & Tirole, 1997). We find that distributed decision-making can lead to economic outcome patterns and emulates centralized decision-making if the evaluation task is framed toward supporting the organization. These findings underline that whether decision-making is distributed or non-distributed does not solely determine decision-making patterns. Instead, at least in the context of our distributed idea evaluation task, we were able to align the outcome patterns with different goals.

Moreover, we also contribute to the literature on idea evaluation. Specifically, we inform the nascent literature dealing with the context of idea evaluation decisions (e.g., Keum & See, 2017) by introducing framing the evaluation task as an important factor influencing idea evaluation. Our findings imply firms need to design their communications surrounding the idea evaluation tasks carefully. So far, this has been a neglected facet within the idea evaluation literature.

5.6.2 Managerial Implications

Our work also has significant managerial implications. Our study demonstrates the importance of carefully framing the distributed decision-making task – small changes have large effects. To our surprise and to the surprise of our research partners, even subtle changes in the communication had effects on the quality and quantity of selected ideas. Depending on whether a framing focused on the organization or a framing focused on the peers is chosen, the quantity and quality of selected ideas in a distributed idea evaluation task can change significantly.

This study's results suggest that managers can use the framing of the distributed decision-making task to shape intended outcomes (e.g., to encourage more conservative or unconventional decisions). Importantly, as opposed to other previously identified factors influencing idea evaluation behaviors that might be difficult to alter, framing the idea evaluation task in a distributed decision-making scenario can be a relatively cost-effective and straightforward tool for firms to steer the evaluation process.

Our findings appear especially important, considering the increasing adoption of decentralized and digitally mediated idea evaluations. In such contexts, it is easier for firms to shape task framing to steer behavior towards preferred outcomes strategically.

5.6.3 Limitations and Future Research

Our work should be qualified in light of several limitations. First, although we believe that the context of our study is especially advantageous to the investigation of our research question since it is relatively free of other organizational ways of directing behavior (e.g., behavior was voluntary, decoupled from incentives, concealed through anonymity), we cannot exclude that potential spill-over effects influenced the outcomes of our study. Secondly, since participation was voluntary, our findings hold conditional on participation. We also cannot fully rule out that other hidden processes also impact the outcomes of our field experiment.

Our results also suggest fruitful and interesting opportunities for future research. Firstly, future research could help to develop a more precise understanding by studying the framing of the distributed decision-making task and its interaction with other traditional mechanisms to steer behavior.

Another area that deserves attention is the study of other framings for distributed decision-making and their application across different contexts. Although we studied an important framing (organization vs. peer framing) for distributed decision-making, it might be interesting to expand our findings and study other potential framings (e.g., gain or loss-framing) for distributed decision-making tasks.

6 Overall Discussion and Conclusion

The adoption of digital technologies has begun to affect a wide range of internal operations and processes in organizations (Kretschmer & Khashabi, 2020). Specifically, this adoption has started to affect how decision-making in companies is organized (Nambisan et al., 2017; Yoo et al., 2012). Increasingly, companies have also implemented technologies and tools to open up idea evaluation to employees throughout the company. These new approaches to distributed decision-making appear promising for a variety of reasons. Although internal crowdfunding seems to be an especially promising new possibility for distributed idea evaluation, many questions remain unanswered.

This dissertation is motivated by three research questions. The first study in Chapter 3 investigates a new tool for distributed or decentralized decision-making by asking: *What design principles and trade-offs affect the functioning of internal crowdfunding?* The second study in Chapter 4 asks *whether and how hierarchical similarity between ideators and evaluators biases idea selection in decentralized decision-making.* Finally, the third study in Chapter 5 *examines whether and how framing the distributed decision-making task toward furthering organizational goals vs. peer goals affects decisions*. Beyond their practical relevance, these questions represent theoretical gaps unanswered by the extant research on distributed decision-making, idea evaluation, and internal crowdfunding.

The first study finds four critical benefits of a new form of distributed decision-making – internal crowdfunding. Internal crowdfunding helps to drive decentralization, cross-collaboration, institutionalization, and intrapreneurship. Three essential design elements of internal crowdfunding (contributors, configuration, control) and three key challenges (dealing with rejected ideas, evaluation biases, and implementation and follow-on funding) are identified and provide an essential guide for thinking about how to design internal crowdfunding initiatives. The study also proposes potential actions for managers to overcome the challenges.

Study 2 uses a dataset from internal crowdfunding at one of the world's largest industrial manufacturers to show that idea evaluators overvalue the ideas of others who are hierarchically similar. This bias is particularly strong if evaluators and creators are not so close as to being rivals and for novel ideas.

Study 3 uses a field experiment in a natural setting, in which a firm uses internal crowdfunding to generate and select ideas. Decision-makers were randomly allocated to one of three intervention groups (organizational (treatment 1) vs. peer (treatment 2) vs. control). The third study identifies significant differences between these groups in how they evaluate ideas in terms of quality and quantity of ideas. Specifically, decision-makers support fewer ideas when the goal of an idea evaluation task is framed towards the organization compared to when the goal of an idea evaluation task is framed towards peers. They also support ideas with a higher strategic fit and lower novelty. The findings have important implications for research on 1) distributed decision-making, 2) idea evaluation, and 3) internal crowdfunding.

6.1 Theoretical Contributions

6.1.1 Contributions to Distributed Decision-Making Research

This dissertation makes several important contributions to research on distributed decision-making. This literature has started to investigate how decision-making structure influences errors in idea selection and how organizational structure may aggravate the psychological biases of decision-makers (e.g., Christensen & Knudsen, 2010; Csaszar, 2012; Csaszar & Eggers, 2013; Keum & See, 2017; Knudsen & Levinthal, 2007; Reitzig & Maciejovsky, 2015; Reitzig & Sorenson, 2013). Unfortunately, it has only recently begun investigating how the organization can use crowds in distributed decision-making (e.g., Csaszar, 2018; Csaszar & Eggers, 2013). Furthermore, it started to explore how to deal with the potential costs of losing control of delegating decision authority to harness the benefits of decentralized/distributed

decision-making (e.g., Aghion & Tirole, 1997; Gambardella et al., 2020). This dissertation makes important contributions to research in all of those three areas.

First, as was shown in Chapter 2.1, more insights on biases or errors rooted in the organization of innovation (Colombo et al., 2021; Keum & See, 2017) are needed to inform the optimal design of distributed decision-making systems properly. Besides the seminal exception of Reitzig and Sorenson (2013) and Keum and See (2017), very few studies have investigated biases rooted in attributes of organizational structure. While distributed decision-making systems supposedly benefit from the absence of hierarchy, the second study shows that hierarchical biases may persist in decentralized idea evaluation systems such as internal crowdfunding. In other words, the organizational hierarchy may cast a shadow on such systems and remains a strong source of identification and behavior in these systems. These findings contribute to the conversation, which uncovers biases in centralized, hierarchical organizational decision-making on the one hand (Criscuolo et al., 2017; Hegde & Tumlinson, 2014) and in distributed, participative decision-making on the other hand (Greenberg & Mollick, 2017; Reitzig & Sorenson, 2013).

Second, prior literature on distributed decision-making has also focused on how traditional decision-making structures in firms influence errors in idea selection (e.g., Christensen & Knudsen, 2010; Csaszar, 2012; Csaszar & Eggers, 2013; Knudsen & Levinthal, 2007). Unfortunately, it has only recently begun investigating how the organization can use crowds in distributed decision-making, primarily employing computational models (e.g., Csaszar, 2018; Csaszar & Eggers, 2013) and requires empirical observations. The findings in this dissertation inform this emerging literature by studying the use of crowds in organizational settings. This research may be particularly fruitful as firms increasingly leverage organizational crowds in their decentralized decision-making systems, sometimes along with traditional organizational structures.

Third, a rich body of research on decentralized decision-making has also illustrated that distributed decision-making has a range of advantages for firms. Examples are the possible integration of many stakeholders' perspectives (Weiser et al., 2020), advantages of division of work (Raveendran et al., 2021), improved speed and quality of decisions (Yukl & Fu, 1999), and increased employee motivation through autonomy (Gambardella et al., 2020). In consistence, the first study finds similar benefits for internal crowdfunding – a new tool for distributed decision-making that firms increasingly use.

However, the delegation of decision-making authority may also come at the cost of losing control (e.g., Aghion & Tirole, 1997). This raises the question of how firms capture the benefits of delegating decision-making authority without losing control (e.g., Markides, 2022).

This dissertation introduces framing as an instrument for managerial control of distributed decision-making, essentially answering the call for research on how dispersed work can be controlled and managed (Cardinal et al., 2017). Study 3 shows that framing the distributed decision-making task can, in fact, shape decision outcomes and that framing can be a powerful tool in distributed decision-making. In the field experiment, even subtle changes in the framing of the distributed decision-making task have influenced outcomes significantly. An important reason for the delegation of decision-making authority is the idea that lower-level employees have valuable knowledge (e.g., about consumer needs, technologies, and product opportunities) that can help the organization reach its goals (Dessein, 2002). Framing allows a firm to capture these benefits by focusing the task on the goals for the specific initiative. Employees will translate the goals into criteria and move towards the goal as they see fit, based on their various knowledge sets. I find that organizational framing can potentially counteract problems with loss of control in distributed decision-making (Aghion & Tirole, 1997). My research finds that distributed decision-making can lead to economic outcome patterns and emulates centralized decision-making if the evaluation task is framed toward supporting the

organization. The findings underline that whether decision-making is distributed or non-distributed does not solely determine decision-making patterns.

6.1.2 Contributions to Idea Evaluation Research

This dissertation also makes significant contributions to the literature on idea evaluation. As shown in Chapter 2.2, research on creator-evaluator relationships, such as the ubiquitous vertical creator-evaluator relationships in organizations, is scarce and necessary. In this regard, idea evaluation in distributed decision-making offers exciting research opportunities for upward and peer evaluation, along with downward evaluation. There is also a need for more research investigating the interplay between previously known biases and novelty in general and in distributed decision-making specifically. Furthermore, research on the context of idea evaluation (e.g., the methods used for idea evaluation, e.g., Blohm et al., 2016; Klein & Garcia, 2015) has only recently started to attract more attention from scholars. This dissertation set out to make significant contributions to research within these areas.

First, Study 2 contributes to this literature by explaining *how* and *why* hierarchical similarity distorts distributed idea evaluation. It proposes hierarchy-based homophily as the underlying process that leads evaluators to overvalue ideas of others who are hierarchically similar. The findings speak to research calling for investigations of when organizational position similarity turns into competition (Reitzig & Sorenson, 2013) or turf wars (Criscuolo et al., 2017). These insights bound the usefulness of distributed idea evaluation and show that hierarchy may reach into 'democratized' decision systems.

Second, the second study fills a gap in the literature by investigating the interplay between structural similarity biases and novelty (see also Criscuolo et al., 2017). The study finds that social evaluation also depends on novelty, proposing uncertainty as the mechanism: greater idea novelty increases evaluation uncertainty (cf. Mueller et al., 2012), which makes the

evaluation's social context more salient. Distributed selection of highly novel ideas requires special care in selecting crowd participants to ensure an unbiased evaluation.

Third, all studies in this dissertation have explored research questions in the empirical context of a new and promising method for idea evaluation – internal crowdfunding. Study 3 also informs the nascent literature dealing with the context of idea evaluation decisions (e.g., Keum & See, 2017) by introducing the framing of the evaluation task as an essential factor influencing idea evaluation. The findings imply that firms must carefully design their communications surrounding the idea evaluation tasks to shape desired outcomes. So far, this has been a neglected facet within the idea evaluation literature.

6.1.3 Contributions to Internal Crowdfunding Research

Finally, this dissertation contributes to emergent internal crowdfunding research (e.g., Feldmann et al., 2014; Feldmann & Gimpel, 2016; Muller et al., 2013), which has studied internal crowdfunding in very few firms so far. Prior research has only begun identifying promising benefits of internal crowdfunding, while other findings point to potential challenges. Knowledge on how to shape the outcomes of internal crowdfunding initiatives is currently missing. This dissertation makes an important contribution to research in these areas to leverage the wisdom of internal crowds for distributed decision-making effectively.

First, it extends extant research by exploring distributed decision-making in internal crowdfunding at three firms: Siemens, Lufthansa, and Kühne + Nagle. The first study discusses three crucial design elements of internal crowdfunding. By examining the organization of internal crowdfunding and the design elements in different contexts, it answers calls for further research about design principles and the use of internal crowdfunding across companies (e.g., Simons et al., 2019). For example, this dissertation investigates previously unexamined design features of internal crowdfunding initiatives at firms, such as continuous efforts versus the more common tournament style.

Second, prior research has only started to identify promising benefits of internal crowdfunding, such as high levels of participation and cross-departmental collaboration (Muller et al., 2013), valuable proposals (Muller et al., 2013), quick decisions (Feldmann et al., 2014), employee network growth (Muller et al., 2018), and employee engagement (Benz, 2022). In extension to the literature, the first study summarizes four important benefits of internal crowdfunding (decentralization, cross-collaboration, institutionalization, and intrapreneurship). By providing a broader picture of how companies can benefit from internal crowdfunding, the findings of this dissertation are well suited to inform both academic discourse and practitioners.

Third, other findings in the literature point to potential challenges such as higher success rates for creators who share attributes with evaluators (Muller et al., 2014) or have bigger networks (Muller et al., 2016). This dissertation has shown three additional challenges (dealing with rejected ideas, evaluation biases, and implementation and follow-on funding) and potential actions for managers to overcome them. Furthermore, Study 2 extends previous research on higher success rates for creators who share attributes with evaluators in internal crowdfunding (Muller et al., 2014) by relating homophily to attributes of organizational structure, explaining *how* and *why* hierarchical similarity distorts distributed idea evaluation.

Fourth, knowledge on how to shape the outcomes of internal crowdfunding initiatives is currently missing. By introducing framing as an instrument for managerial control, Study 3 examines this so far neglected area of research in internal crowdfunding and gives managers a cost-effective tool to steer evaluation behavior towards preferred outcomes.

Given the increasing use of distributed decision-making and internal crowdfunding in organizations, this dissertation provides much-needed insights into how internal crowdfunding platforms must be designed and managed to leverage the wisdom of internal crowds for distributed decision-making effectively. Taken together, the studies in this dissertation advance

our understanding of distributed decision-making in the context of internal crowdfunding initiatives.

6.2 Managerial Implications

This dissertation also has significant managerial implications. Important and hitherto unanswered organizational questions about distributed decision-making, specifically distributed idea evaluation, inspired this dissertation. An important set of managerial questions is interested in how these new tools should be designed and which trade-offs affect their use. More knowledge is also needed about the decision quality of distributed decision-making systems. After all, managers need to know which factors bound the usefulness of distributed decision-making and which factors indicate when hierarchical decision-making by experts may be more efficient. Finally, a set of questions revolves around how firms can shape outcomes of distributed decision-making in ways that support the firm's objectives.

First, this dissertation explores four important benefits (decentralization, cross-collaboration, institutionalization, and intrapreneurship), which internal crowdfunding, a new form of distributed decision-making, entails. When designing an internal crowdfunding campaign, managers must deal with three design elements (contributors, configuration, and control). It also identifies three key challenges (dealing with rejected ideas, evaluation biases, and implementation and follow-on funding) and potential actions from managers to overcome them. Internal crowdfunding must be actively managed to overcome roadblocks that can emerge at different points in the process if managers want to capture the significant benefits for innovation, collaboration, and employee engagement.

Second, concerning questions about the decision quality of distributed decision-making, this dissertation presents some results that practitioners may find surprising or even counterintuitive. First, the dissertation finds that hierarchy reaches into such 'democratized' decision systems. Even if such systems are free from formal hierarchical authority, they are not

hierarchy-free. Notably, hierarchy produces biases in both – albeit different – system types that need to be weighed against each other. Second, the results suggest that particular care is needed to maintain unbiased evaluation in the distributed selection of highly novel ideas. Overall, these insights strengthen calls for the careful design of distributed decision systems (see Birkinshaw, 2017; Stieger et al., 2012). Awareness of potential distortions enables better decision system design and – ultimately – better decisions. For instance, firms may consider anonymizing idea proposals to overcome the homophily-based hierarchical similarity bias and other biases relating to ideators' characteristics.

Third, this dissertation also answers managerial questions about how firms can shape outcomes of distributed decision-making in ways that support the firm's objectives. Study 3 introduces the framing of the distributed decision-making task as a tool for firms to purposefully steer behavior towards preferred outcomes. The results suggest managers can use the framing of the distributed decision-making task to shape intended outcomes (e.g., to encourage more conservative or unconventional decisions). Whether a framing focused on the organization or a framing focused on the peers is chosen, the quantity and quality of selected ideas in a distributed idea evaluation task can change significantly. To my surprise and the surprise of my research partners, even subtle communication changes affected the quality and quantity of selected ideas. Overall, managers must carefully consider how they frame distributed decision-making tasks.

In summary, all three studies examine important questions on distributed decision-making in firms and can inform managerial practice.

6.3 Conclusion

The adoption of digital technologies has begun to affect a wide range of internal operations and processes in organizations (Kretschmer & Khashabi, 2020). Particularly important is that this adoption has started to affect how decision-making in companies is organized (Nambisan et al., 2017; Yoo et al., 2012). Increasingly, companies have also implemented technologies and tools to open up idea evaluation to employees throughout the company. These new approaches to distributed decision-making appear promising for a variety of reasons, and although internal crowdfunding seems to be an especially promising new possibility for distributed idea evaluation, many questions hitherto remain unanswered. Three especially pressing sets of questions have motivated this dissertation.

First, how should firms design and use this cutting-edge tool to capture the alleged benefits? What design principles and trade-offs can be identified and applied? The second set of essential questions is related to the quality of the decisions that managers can expect when implementing distributed decision-making tools. How economically sensible is it to make decisions in this way? What bounds the usefulness of distributed decision-making, and when are other forms of decision-making (e.g., decisions by experts or managers) more efficient? Finally, the third set of important questions is related to the managerial control of the decisions. Which instruments for managerial control are feasible to manage distributed decision-making effectively?

In this dissertation, I have contributed to each of these sets of important questions. I identify critical benefits, essential design elements, and potential challenges of a new form of distributed decision-making – internal crowdfunding. Furthermore, with respect to decision quality, the dissertation investigates hierarchical homophily. Finally, this dissertation explores the framing of the distributed decision-making task as a tool to steer evaluation outcomes.

The studies help close important gaps in the literature and provide practical insights for managers into effectively using new tools for distributed idea evaluation. As the list of exciting research questions remains long, I hope this dissertation will inspire others to continue the work on this promising phenomenon.

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APPENDICES

Appendix A: Distributed Decision-Making in the Shadow of Hierarchy: Idea Evaluation Biases in Internal Crowdfunding

Figure A11 shows the presentation of an idea as seen by the idea evaluators. We altered idea content and ideator information to maintain confidentiality. Information about the idea creator is visible under "AUTHOR" in the bottom right panel. Besides the idea creator's image and the name, a label indicated the position in the organizational structure (here: "CT TIM VS"). From the composition of this label, employees can read both the hierarchical and the vertical positions of other employees. The notation is well-known and a standard throughout the entire enterprise. We ensured in qualitative follow-up interviews that idea evaluators perceived the idea creator information, including their hierarchical level and their horizontal position in the organization.

The other panels describe the idea ("Short description"), the "Current Solutions," "Benefits for the User," "Possible Use Cases," and "Work Packages & Deliverables" as specified by the idea creator in the ideation phase. Another panel shows the investment goal and the current investment progress ("Budget").

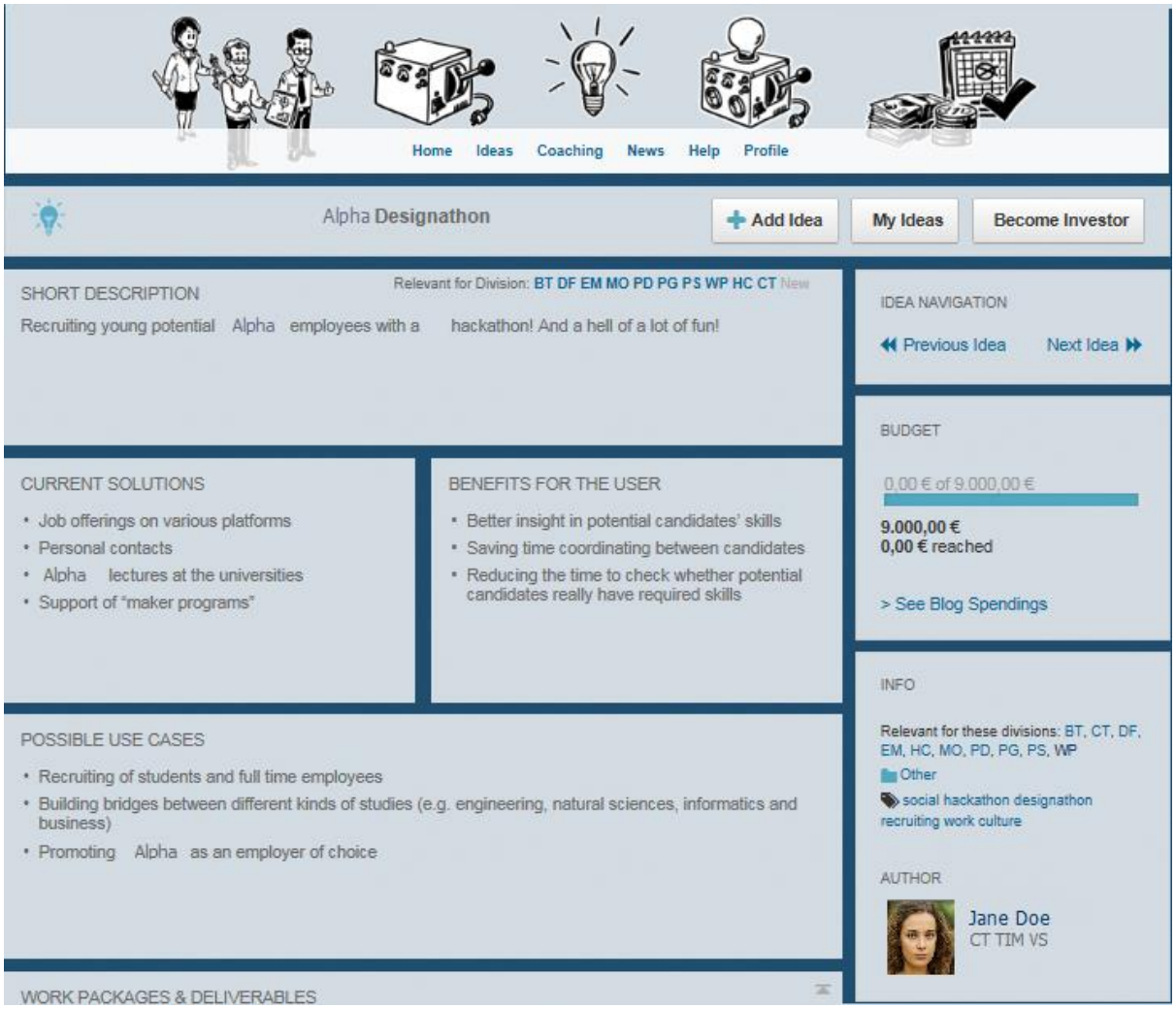
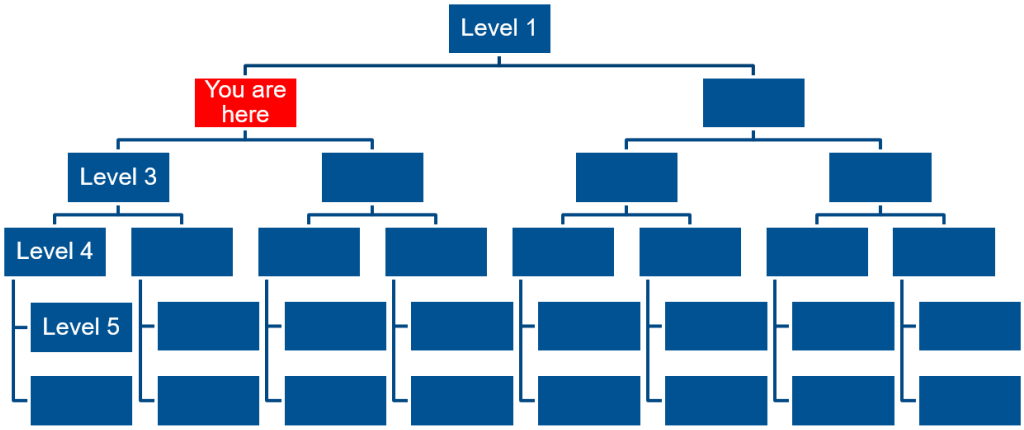
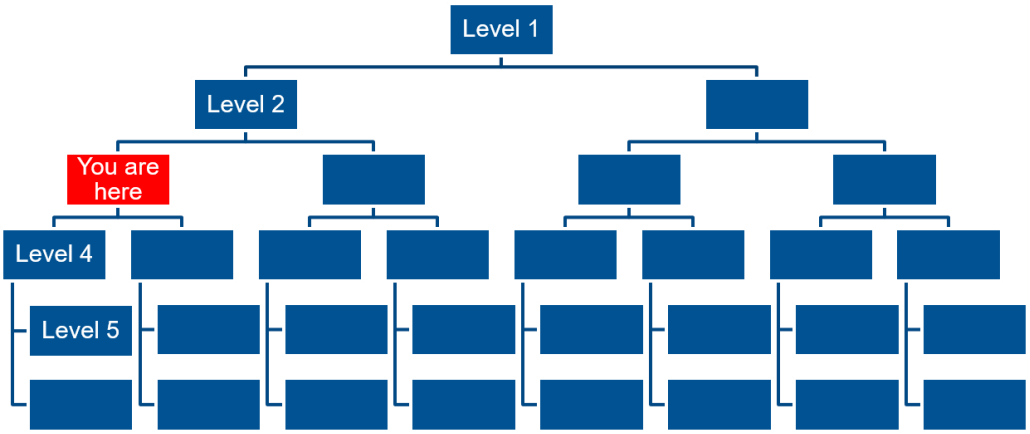


Figure A11 Screenshot of Idea Presentation (Information Altered).

Table A10 Stimuli Experiment

Page (condition)	Stimuli
1	Please imagine that you work in a firm that produces locks for bicycles. Your firm called for ideas from all employees in an idea competition. Of all these ideas, only a **limited number will be implemented and rewarded**. Now, after ideas have been collected, a number of employees including you have been asked to **evaluate these ideas and to decide which ones to implement**. Shortly you will be presented with **three ideas** you should evaluate.
2 (top level)	Below, you see an organizational chart of the bike lock firm that you work for. Your current position is indicated on the chart.  Your position in the organizational hierarchy is at a top level.
2 (medium level)	Below, you see an organizational chart of the bike lock firm that you work for. Your current position is indicated on the chart.

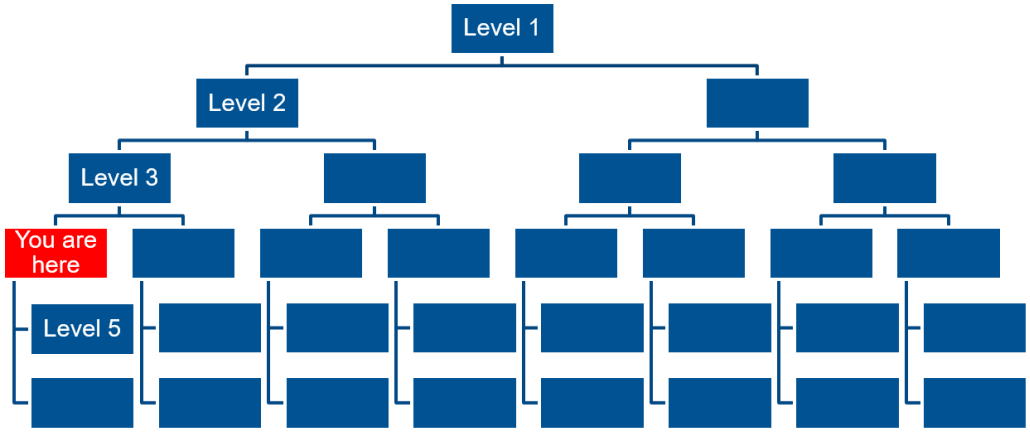


Your position in the organizational hierarchy is at a medium level.

2 (low level)

Below, you see an organizational chart of the bike lock firm that you work for.

Your current position is indicated on the chart.



Your position in the organizational hierarchy is at a low level.

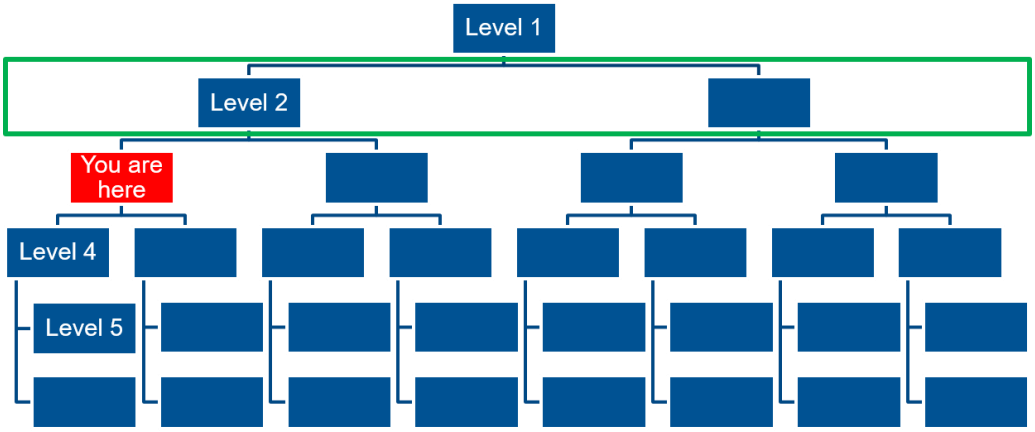
3 (medium hierarchy level and top level idea creator with idea 1)	**Alarm system with numerical code** The idea involves an alarm system for bicycles, which can be activated by the owner by means of a numerical code. If the bike is moved in this state, the vibrations trigger the alarm and a loud warning signal sounds. The owner can stop the signal by entering the numerical code. The idea comes from someone at a top level in the organizational hierarchy (level highlighted in green). 

Table A11 Idea Description

Idea title	Idea description	LIWC	
Alarm system with numerical code	The idea involves an alarm system for bicycles, which can be activated by the owner by means of a numerical code. If the bike is moved in this state, the vibrations trigger the alarm and a loud warning signal sounds. The owner can stop the signal by entering the numerical code. (51 words)	I-words (I, Me, My)	0.0
		Social Words	5.9
		Positive Emotions	0.0
		Negative Emotions	5.9
		Cognitive Processes	9.8
		Analytic	99.0
		Clout	65.3
		Authenticity	6.2
		Emotional tone	1.0
Self-locking bike lock with distance measurement	The idea involves a self-locking bike lock. The immobilizer is triggered when the owner of the bike moves more than 2 meters away from the bike with his registered smartphone. The identification and distance measurement works via Bluetooth and activates the lock only when in a stationary position - not while riding. (52 words)	I-words (I, Me, My)	0.0
		Social Words	7.7
		Positive Emotions	0.0
		Negative Emotions	0.0
		Cognitive Processes	11.5
		Analytic	98.5
		Clout	57.6
		Authenticity	83.8
		Emotional tone	25.8
Touch bicycle grips	The idea involves bike grips with sensitive touch sensors that learn and then recognize the owner's handprint. The owner can register any number of users and save their handprint to unlock the bike. However, if a third party tries to ride the bike, an automatic immobilizer is triggered. (49 words)	I-words (I, Me, My)	0.0
		Social Words	10.2
		Positive Emotions	4.1
		Negative Emotions	0.0
		Cognitive Processes	14.3
		Analytic	95.0
		Clout	73.0
		Authenticity	7.2
		Emotional tone	91.8

Ideas were based on a previous study by Greul, Schweisfurth, & Raasch, 2020 and translated and adapted to study

Appendix B: The Effect of Framing on Distributed Decision-Making: Evidence from a Field Experiment in Idea Evaluation

Table B12 Balance Table of Investor Characteristics by Treatment Assignment

	Treatment			
	Social	**Organizational**	**Control**	**p-value** Chi2 / Tukey
Treatment groups (N)	116	105	121	
Investor gender				0.915
Female	0.164	0.171	.157	
Male	0.767	0.733	.777	
NA	0.069	0.095	.066	
Investor country				0.587
AT	0.052	0.067	0.025	
CH	0.026	0.019	0.050	
CL	0.000	0.000	0.008	
CN	0.000	0.010	0.025	
CZ	0.043	0.076	0.041	
DE	0.724	0.648	0.744	
GB	0.017	0.029	0.025	
GR	0.000	0.000	0.008	
HU	0.069	0.076	0.041	
IN	0.017	0.010	0.000	
NL	0.000	0.010	0.000	
US	0.052	0.057	0.033	
Investor unit				0.850
BT	0.043	0.038	0.083	
CD	0.017	0.019	0.025	
CF	0.017	0.000	0.000	
CT	0.776	0.743	0.686	
DF	0.026	0.038	0.058	
EM	0.017	0.000	0.025	
GS	0.009	0.029	0.017	
HR	0.000	0.029	0.008	
LC	0.017	0.010	0.008	
MISC	0.017	0.019	0.008	
MO	0.017	0.029	0.017	
PD	0.017	0.019	0.025	
PG	0.009	0.010	0.017	
PS	0.000	0.000	0.008	
RC	0.017	0.019	0.017	
Hierarchical level investor				*
Mean	3.448	3.705	3.645	

* No pairwise comparison shows signifcant difference with Tukey's method

Contribution to study 1 (Chapter 3)

Together with the authors, C.S. conceived the study. C.S. prepared the interview guidelines. Together with the authors, C.S. conducted the interviews. C.S. transcribed the interviews and summarized the results. C.S. took the lead in writing the manuscript with input from the authors. All authors provided critical feedback and helped shape the research, analysis and manuscript.

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Contribution to study 2 (Chapter 4)

Together with the authors, C.S. conceived the presented study. C.S. collected the field data and prepared them for analysis. Together with the authors, C.S. designed the experiment. C.S. carried out the experiment, collected the data and prepared the data for analysis. C.S. contributed to the analyses of the data and writing of the manuscript. All authors provided critical feedback and helped shape the research, analysis and manuscript.

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Contribution to study 3 (Chapter 5)

Together with the authors, C.S. designed the study. C.S. collected the data and prepared the data for analysis. C.S. performed the analyses with feedback from all authors. Together with the authors, C.S. contributed to the interpretation of the results. C.S. took the lead in writing the manuscript. All authors provided critical feedback and helped shape the research, analysis and manuscript.

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