
# Designing idea contests to optimize the front end of the innovation process

Dissertation presented to obtain the degree of Doctor in Business Economics

By

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# Acknowledgements

"*None of us are ever finished. Everyone is always a work in progress.*"

— *Haruki Murakami, Killing Commendatore*

The document you are about to read provides a thorough overview of my research on idea contests, an accumulation of research conducted over a time span of the past five years. Faced with a world where speed, efficiency and quick turnover are (becoming) the expected norm, it is rare to be able to spend such a long period of time to work on one larger piece of academic work. The doctorate is one of those rare, privileged opportunities. While at times, it can feel as a gargantuan task to accomplish, it is in fact an extended trajectory where you get the time, education and tutorship to develop your own professional capabilities and where you are given the time and autonomy to study a certain discipline for an extensive period of time. While this documents provides an exhaustive overview of my research endeavours on idea contests in the field of innovation management, I do not consider it the final end product of my doctoral journey. I consider the end product of my doctorate to be the professional development, transformation and growth that has made me who I am today. And in this regard, I want to take this opportunity to acknowledge and thank a few persons for their contribution to my professional learning journey over the past five years.

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April 2021

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# General Introduction

## I. Motivation

At the start of the millennium, the existent approach to managing innovation - consisting of heavily investing in internal R&D units comprised of highly-skilled workers to generate and develop ideas into patentable technologies and innovations (Freeman, 1974; Rothwell, 1992) - was challenged by the introduction of the open innovation model as a 'new' approach to managing innovation (Chesbrough et al., 2006; Enkel et al., 2009; Trott & Hartmann, 2009; Dahlander & Gann, 2010). Apart from creating a more porous approach to innovation processes, where ideas could originate and flow more freely from internal actors to the external environment, it advanced the notion that various different groups or crowds of actors could be called on for generating, developing and commercializing ideas (Salter et al., 2015). Or as phrased by Nobel Prize winning economist Edmund Phelps (2013):

> "*Most innovation was not driven by a few isolated visionaries like Henry Ford and Steve Jobs; rather, it was driven by millions of people empowered to think of, develop, and market innumerable new products and processes, and improvements to existing ones.*
> *- Edmund Phelps (2013)*

Riding on the open innovation paradigm, firms turned to invite previously untapped actors and groups to suggest ideas for new products, services or innovations, including customers (Poetz & Schreier, 2012; Debruyne, 2014), lead users (Von Hippel, 2005; Di Gangi & Wasko, 2009) and the employee workforce at large (Kijkuit & Van den Ende, 2007; Bingham & Spradlin, 2011). While the central spotlight of the open innovation literature centred on how external actors could be integrated into the innovation factory of the firm (Von Hippel, 2005; Howe, 2006; Brabham, 2010; Poetz & Schreier, 2012; Debruyne, 2014), less scholarly attention was directed initially at the employee workforce as a valuable source for grass-rooting ideas and developing them into innovations (Bowen & Lawler, 1995; Van Dijk & Van den Ende, 2002; Malhotra et al., 2017). The employee workforce

nonetheless is characterized as an easily accessible group, who hold distributed knowledge on the product, services and tasks in the organization, as well as having a general understanding of the organization's core values and strategy (Afuah & Tucci, 2012). In large organizations in particular, where a substantial number of employees are distributed in terms of geographic locations, department and hierarchical levels, the workforce can be considered as a highly potential, diverse and knowledgeable source for identifying opportunities and creating ideas that can feed into the innovation pipeline of the firm (Neyer et al., 2009; Björk & Magnusson, 2009; Bergendahl & Magnusson, 2015).

To attract, support and involve large groups of employees in the innovation process with the purpose of letting them generate, suggest, refine and develop ideas, firms started to increasingly adopt web-enabled idea management systems or platforms (Van Dijk & Van den Ende, 2002; Van den Ende et al., 2015; Beretta et al., 2018). Involving large groups of employees on a digital idea management platform brought forward several organizational challenges, such as dealing with the large amount and variety of suggested ideas, as well as managing employee engagement and an effective screening and selection of ideas. Since not all ideas can be pursued, developed and commercialized - as this would swallow insurmountable resources, time and manpower - a structured process was necessary in order to effectively and efficiently screen and select the most promising ideas. It is therefore that - accompanying the adoption of digital idea management platforms - the idea contest was (re-)introduced to managerial practice as a fitting innovation process to funnel and narrow down the large pool of ideas into a selected few ideas of promising potential (Terwiesch & Ulrich, 2009; Adamcyzk et al., 2012).

At its core, an idea contest is a process where participants strive to generate, submit and ameliorate ideas in response to prespecified challenges, and where the ideas are developed and evaluated to filter out the most exceptional ideas. The basic core of an idea contest entails that actors respond to a challenge by submitting ideas that are evaluated and the best ideas then are selected. But beyond this common structure important differences exist in the way idea contests are set up or 'designed' (Terwiesch & Ulrich, 2009). Altogether, it is a critical process to organize as it occurs at the very start of the innovation process, determining what ideas will be developed and commercialized into innovations.

This thesis aims to increase the understanding on how firms can adequately set up or design idea contests in order to improve their front end performance. Whereas the idea contest itself will serve as the protagonist throughout this dissertation, the central theme of this thesis centres on how ideas are managed in organizations. It is my ambition to shed light on several central activities of the creative process that are submersed in idea contests including *idea generation, idea development* and *idea selection*. By doing so, the thesis contributes to the innovation management literature at large, and the extant body of research on the innovation front end in particular.

In the next part of this introduction, a definition and exposition of what we understand under the term 'idea contest' is outlined, as well as its positioning in firm's innovation processes. In doing so, I indicate why it is a relevant topic to investigate and I outline several identified gaps in the extant literature that are worthwhile to explore. Before continuing to the three studies that make up the body of this dissertation, the research strategy employed to tackle the research questions is touched upon.

## II. Enter the idea contest: a definition and exposition

An idea contest, interchangeably labelled as an innovation tournament (Terwiesch & Ulrich, 2009), idea competition (Piller & Walcher, 2006; Nicolajsen et al., 2019), innovation contest (Malhotra & Majchrzak, 2014; Kokshagina et al., 2017), crowd contest (Boudreau & Lakhani, 2011) or tournament for ideas (Morgan & Wang, 2010) is a 'competitive' process where participants strive to generate, submit and ameliorate ideas in response to prespecified *challenges*. A firm, namely the seeker of ideas and opportunities, poses one or multiple challenges to a crowd. The agents in the crowd then compete to generate, submit and ameliorate the best idea or solution for the specified challenges. The seeker evaluates the ideas in order to identify the most outstanding idea(s), most often over the course of a series of subsequent early-development steps and elimination rounds (Terwiesch & Ulrich, 2009). For a contestant, winning involves scoring relatively better than all or most of his adversaries on a (couple of) pre-defined criteria of idea quality at each round. An idea contest therefore embodies the Darwinian principle of the survival of the fittest as it creates a pool of ideas and then evaluates and extracts the most promising ideas from this pool (Terwiesch & Xu, 2008; Terwiesch & Ulrich, 2009; Adamcyzk et al., 2012).

The use of contests to stimulate human endeavours is no new thing. As a longstanding field of contest theory testifies, contests such as races, sports competitions, auctions, wars of attrition, lottery contests and rank-order tournaments can be a powerfull mechanism to evoke and steer human effort exertion to reach certain objectives or achievements (Harris & Vickers, 1985; Rosen, 1985; Bull et al., 1987; Cason et al., 2010; Connelly et al., 2014; Dechenaux et al., 2015). The first use of contests to spur innovation achievements goes back as far as to the conquest of the New World, where in the years 1567 and 1714 the *naval longitude prizes* were organized by the Spanish and British governments, respectively. These idea contests were used to propel their naval conquest of the New World and led to the discovery of new ways to calculate longitudes at sea (Wright, 1983; Adamcyzk et al., 2012). The most renowned idea contest in history would arguably be the *French Food Preservation Prize*, an idea contest issued in 1795 in name of Napoleon Bonaparte III by the Directory (*'le Directoire'*) to award the person who could find a solution for better preservation of food to address Napoleon's dilemma reflected in the adage that "an army travels on its stomach" (Khan, 2005; Freedman, 2015). The French Food Preservation prize contest led to the invention of margarine and better canning of food, awarding the inventor with a 15-year patent for processing and production of animal fats (Khan, 2005).

While historically these contests were used on an irregular basis, idea contests found their place in the corporate context around the 2010's, riding on the open innovation paradigm. Especially due to the widespread diffusion of digital idea management platforms, idea contests became increasingly implemented by profit and non-profit organizations to bring order and structure to the outset of the innovation process and to bolster up the exploration activities of the firm (March, 1991; Adamczyck et al., 2012).

# III. Front end of the innovation process

In order to fill their innovation pipelines, organizations are increasingly using idea contests as a process to manage the beginning of the innovation process (Deichmann & Van den Ende, 2014; Malhotra et al., 2017; Lifshitz-Assaf et al., 2020). The first academic innovation studies outlining firm's use of an idea contest state that it has – at its core – two functions: a) the creation of a pool of ideas or opportunities and b) the selection of the most promising ideas from that pool (Terwiesch & Xu, 2008;

Terwiesch & Ulrich, 2009; Morgan & Wang, 2010; Adamcyzk et al., 2012). The creation and selection of ideas is widely recognized by innovation scholars as central components of the first phase of the innovation process, more commonly known as the creative process or the fuzzy front end.

The *fuzzy front end* (FFE) of the innovation process occurs prior to the formal and usually well-structured new product development (NPD) process (Cooper & Kleinschmidt, 1986; 2007) and is in turn followed by the implementation or commercialization process (Smith & Reinertsen, 1991; Khurana & Rosenthal, 1997; Koen et al., 2002; Kim & Wilemon, 2002). The fuzzy front end is defined "*as the period between when an opportunity is first considered and ends when an idea is deemed ready and selected for development*" (Kim & Wilemon, 2002). Effectively managing the fuzzy front end is generally proposed as both one of the most difficult challenges as well as one of the great opportunities for improving the outcome of the overall innovation process (Cooper & Kleinschmidt, 1987; Wheelwright & Clark, 1992; Khurana & Rosenthal, 1997, Van den Ende et al., 2014).

Over the past two decades, a burgeoning body of literature has identified the core activities and steps that occur in the fuzzy front end, to the point that the term 'fuzzy' tends to be dropped (e.g. the fuzziness is being taken out of the fuzzy front end). By and large, scholars agree that the innovation front end encapsulates several core activities: idea generation, idea development, idea championing and idea selection (Khurana & Rosenthal, 1997; Koen et al., 2002, 2014; Kim & Wilemon, 2002; Perry-Smith & Manucci, 2017). Idea generation, logically the first activity that typically takes place, refers to the act of conceiving an idea and suggesting it. Idea elaboration refers to the activity related to refining, elaborating and revising the idea (Griffiths-Hemans & Grover, 2006; Elmquist & Segrestin, 2007; Floren & Frishammar, 2012), whereas idea championing reflects acts of gaining (financial and human) resources and organizational support for the idea (Perry-Smith & Manucci, 2017). Idea selection typically closes off the front end, as here the ideas that will flow into the development and implementation process are selected (Reitzig & Sorenson, 2013; Criscuolo et al., 2017; Beretta, 2019). Opportunity or idea generation, elaboration, championing and selection are generally considered as non-routine tasks (Nelson & Winter, 1982), equivalent to strategizing, as they consist of genuine choices that are neither random or preordained, and which can permanently (re-)shape the future state of the organization (Laroche, 1995; Laureiro-Martinez, 2014).

# IV. Idea contests as a funnel in the front end of the innovation process

The use of idea contests in the innovation front end started to attract considerable interest from innovation scholars, leading to an avalanche of case studies at first, such as the *Adidas's idea competition* (Piller & Walcher, 2006), *IBM's innovation jam* (Bjelland & Wood, 2008), *Dell's idea storm* (Di Gangi & Wasko, 2009), *Threadless's t-shirt logo design competition* (Ogawa & Piller, 2006; Brabham, 2010), *Deloitte's Innovation Quest* (Terwiesch & Ulrich, 2009), *Swarowski's jewellery design competition* (Füller et al., 2011), the annual *L'Oreal Brandstorm competition* (Benon & Jansson, 2016) and *Ericsson's Idea Boxes* (Beretta et al., 2018), amongst others. Central questions raised and investigated in these case studies include how idea contest organizers manage to create awareness and attract idea contributors to submit ideas (Ebner et al., 2009; Merz et al., 2016), what type of rewards are used to honour and incentivize winners and participants of idea contests (Morgan & Wang, 2010), how to direct the search for ideas through the formulation of challenges (Piller & Walchter, 2006), how to create and maintain momentum during the idea contest (Bayus, 2013; Schemmann et al., 2017; Porter et al., 2020), what online behaviour participants engage in on the digital idea contest platform (Malhotra & Majchrzak, 2014; Schemann et al., 2017) and what functions a moderator should carry out (Beretta et al., 2018). Additionally, several studies have shed light on the competitive nature of idea contest, showcasing that while there is competition between the ideas, the idea contest participants often engage in collaborative behaviour (Koch et al., 2002; Bullinger et al., 2010).

A shortcoming of the extant idea contest literature is that single, often descriptive, case studies (Ogawa & Piller, 2006; Piller & Walcher, 2006; Bjelland & Wood, 2008; Di Gangi & Wasko, 2009; Füller et al., 2011) largely outweigh quantitative research (Boudreau et al., 2011; Wooten & Ulrich, 2017; Piezunka & Dahlander, 2019). Empirical research leading up to causal inferences on the level of the idea contests have been severely limited due to the small-n problem of idea contests (Goldthorpe, 1997), as it is difficult and time-consuming to gain access to data of a single idea contests, let alone multiple idea contests, especially without omitting comparability between the cases (King, Keohane & Verba, 1994; Ragin, 2014). Notwithstanding the investigation of the single case study (Eisenhardt &

Graebner, 2007; Yin, 2017), as they have contributed deep and contextualized descriptive inferences on how idea contests are set up and managed (Morgan & Wang, 2010; Beretta et al., 2018; Nicolajsen et al., 2019). Yet, more empirical studies are needed that compare idea contest designs variations and that test the relationship between idea contest design and front end performance, in the attempt to identify mechanisms and practices that can be reliably replicated in other, comparable settings to attain higher innovation performance (Adamcyzk et al., 2012; Nicolajsen et al., 2019).

At a slower rate, quantitative studies on idea contests emerged, either collected through close collaboration with the idea contest organizing firms (Piezunka & Dahlander, 2019; Beretta, 2019; Zhu et al., 2019), or by setting up self-organized idea contests as experiments (Malhotra & Majchrzak, 2014; Wooten & Ulrich, 2017) or by collaborating with major idea contest software platforms such as Innocentive (Boudreau et al., 2011) or Quirky (Kornish & Ulrich, 2011). This quantitative line of research emphasises the set-up and management of idea contests, linking it with performance in the front end of the innovation process.

# V. Idea contests and front end performance

Front end or idea generation performance is generally recognized to consist of four factors: (1) the number of ideas generated, (2) the average quality of ideas, (3) the quality of the best ideas and (4) the ability to accurately discern idea quality (Girotra et al., 2010; Kornish & Ulrich, 2011; Martinsuo & Poskela, 2011; Wooten & Ulrich, 2017; Criscuolo et al., 2017). The quantity of ideas as performance measure is based on the simple statistical principle that the more ideas are generated, the more likely there will be ideas of high quality in the pool (Terwiesch & Ulrich, 2009; Girotra et al., 2010). In terms of measuring idea quality, some studies have attempted to retrospectively reconstruct idea descriptions, based on synopses of patents described in books or databases (Goldenberg et al., 2001; Chandy et al., 2006) or through reconstructed movie scripts (Eliashberg et al., 2007). Yet, arguments have been made that in order to accurately determine the raw quality of an idea, it is preferred to base this on the idea description in the form it was proposed (Girotra et al., 2010; Kornish & Ulrich, 2011; Mack & Landau, 2018). The most common approach to measure idea quality in innovation front end studies is borrowed from brainstorming studies in the social psychology and creativity literature (Osborne, 1957; Amabile,

1983; 1996; Diehl & Stroebe, 1987; Mullen et al., 1991; Amabile & Hennessey, 2011). Following the approach of consensual agreement and expert panels, idea quality is typically assessed by several experts in agreement on several well-known and accepted criteria, being the novelty, feasibility, relevance and specificity of the idea (Dean, et al., 2006; Amabile & Hennessey, 2011). While the eventual outcome or performance of an idea is clouded by considerable uncertainty, the quality of the raw idea has been consistently shown to be a strong predictor of innovation and market performance of the products and innovations that they grew into (Goldenberg et al., 2001; Dahan et al., 2011; Kornish & Ulrich, 2011; Parida et al., 2017).

This growing body of quantitative research has linked front end performance with the organization of idea contests in several ways. Inviting larger groups of actors to participate in idea contests has been shown to diminish the effort exerted by each participant separately, but still resulting in a larger quantity of generated or suggested ideas (Boudreau et al., 2011). Second, collaboration instructions send out by the organizer has been shown to evoke more collaboration and knowledge-sharing between idea contest participants, leading to higher quality of ideas (Malhotra & Majchrzak, 2014). Finally, considerable research has focused on the role of feedback interactions during idea contests. Empirical studies have shown that feedback can be used to provide additional information about the content of ideas, therefore strengthening idea selection accuracy (Beretta, 2019), it can lead to more subsequent idea submissions, even when earlier ideas are rejected (Piezunka & Dahlander, 2019) and feedback can affect the quality of additionally generated ideas (Wooten & Ulrich, 2017; Zhu et al., 2019). The studies reported in this thesis are inspired and build directly on this growing line of empirical studies linking idea contests with front end performance.

## VI. Research objective and outline of the dissertation

The aforementioned literature has made significant advances over the past decade by shedding light on the use and inner dynamics of idea contests in the innovation front end. Yet, several aspects remain unexplored or unknown to this day, in particular when related to linking idea contest design and management with front end activities and performance. The research objective of this thesis therefore intends to contribute new understanding on how firms can adequately design and manage idea contests

to improve innovation front end performance, operationalized differently as idea quantity, idea quality and idea selection in each chapter respectively. To accomplish this objective, a research strategy is employed which combines qualitative and quantitative methodologies, data collection instruments and analysis techniques, in order to study idea contests from a diverse set of Belgian-based organizations, including profit and non-profit organizations, a professional service firm and a university organization. Capitalizing both on the strengths of qualitative and quantitative research (Creswell, 2003; Harwell, 2011), the mix of research methodologies operated in this thesis are used to create novel insights on the design and management of idea contests and to exploratively test how the front end performance (idea generation, development and selection) is affected during idea contests.

This thesis contributes new empirical evidence and insights to several literature streams in the field of innovation management research. All things considered, the research presented in this thesis further progresses the growing body of empirical studies investigating firm's use of idea contests (Terwiesch & Xu, 2008; Morgan & Wang, 2010; Adamcyzk et al., 2012) and in extension the innovation front end literature (Girotra et al., 2010; Boudreau et al., 2011; Kornish & Ulrich, 2011; Beretta, 2019; Piezunka & Dahlander, 2019). It does so by investigating how idea contests can be set up or managed to improve performance in the innovation front end in several ways: (a) by linking idea contest design to idea generation inflow, (b) by investigating how feedback interactions during idea contests can stimulate the early development and enrichment of ideas and c) by shedding light on how idea selection during idea contests is affected by the organizational hierarchy wherein the idea contest takes place. An overview of each chapter is provided below in table 1, outlining the focal topic investigated, the front end performance measure that is used and the research strategy employed.

While the research centres on the use of idea contests explicitly, the research presented also offers contributions to the field of studies investigating web-enabled idea management platforms (Kijkuit & Van den Ende, 2007; Björk & Magnusson, 2009; Beretta et al., 2018; Beretta, 2019) and the ever-growing body of crowdsourcing studies (Adamczyck et al., 2011; Füller et al., 2014; Marion et al., 2014; Kohler, 2015; Majchrzak & Malhotra, 2016; Hütter et al., 2017; Porter et al., 2020). While an innovation management perspective dominates the research in this dissertation, at times, the thesis refers to and draws from related fields in the organizational literature, such as organizational theories

on feedback (Nadler, 1977; Ashford, 1986; Oldham & Cummings, 1996; Zhou, 2008), organizational hierarchy (Ibarra, 1993; Gavetti, 2005; Reitzig & Maciejovsky, 2015; Bunderson et al., 2016; Keum & See, 2017), organizational decision-making (Frederickson, 1983) and organizational creativity (Woodman et al., 1983). Below, an outline of each chapter is provided, denoting the research question tackled, the source of data, and the research methodology applied.

Table 1: Outline of the dissertation

| | **Chapter 1** | **Chapter 2** | **Chapter 3** |
|---|---|---|---|
| **Focal topic** | **Idea contest design configurations** | **The role of feedback** | **Hierarchical function of idea endorsements** |
| **Front end performance** | **Idea generation**  | **Idea development**  | **Idea selection**  |
| **Data** | Multiple case dataset (37 idea contests) supported by the Yambla idea software platform | The Accenture Innovation Challenges (editions 2014, 2015, 2016) | Field experiment at education suborganization of Faculty of Economics and Business (KU Leuven) |
| **Methodology** | Qualitative comparative analysis (QCA) as case study research approach | Survival regression modelling | Randomized block experimental design with pre-test, post-test and post-treatment check |
| **Data collection** | Online platform activity and semi-structured interviews | Online platform activity, human resource database and semi-structured interviews | Self-organized field experiment, physical collection of material, questionnaires and observation |
| **Data analysis** | Fuzzy-set qualitative comparative analysis (fs-QCA) | Cox proportional hazard regressions, interpretitive coding and text similarity analysis | Mean comparisons of treatment and control groups, coarsened exact matching, logistic and ordered probit regression analysis |

## *Chapter 1 - How to Design Idea Contests to Boost Ideation Generation Performance*

How to set-up or design idea contests is a central question that has attracted considerable attention from innovation scholars and practitioners alike. Two decades of innovation literature focusing on the use of idea contests has brought forward a number of central design elements, including the rewards used to attract idea contributors (Terwiesch & Xu, 2008; Archak & Sundararajan, 2009;

Morgan & Wang, 2010), the duration that ideas can be suggested (Bayus, 2013; Schemmann et al., 2017), the promotion of the idea contest (Fairban & Williams, 2001; Lauro et al., 2013; Nicolajsen et al., 2019), the formulation of the challenges (Piller & Walcher, 2006; Boudreau et al., 2011), the role of moderators (Beretta et al., 2017) and the online feedback interactivity (Wooten & Ulrich, 2017; Beretta et al., 2017; Zhu et al., 2018; Piezunka & Dahlander, 2019).While most extant literature has focused on one or two design elements at a time, we argue that each central design element should not be studied in isolation but be an interdependent part of a whole (design configuration). Chapter 1 therefore adopts a configurational perspective by exploratively mapping how the central design elements of idea contests are combined into different configurations in practice and by seeking out how certain design elements are jointly (or disjointly) associated with high and low levels of idea generation inflow in idea contests.

Tracking the idea generation performance and idea contest design choices of thirty-seven idea contests organized and implemented at thirty-four firms between 2014 and 2020, a) dominant archetypes of idea contest design are identified and linked to idea generation performance using the fuzzy-set QCA approach. A theoretical case sampling approach is used to select the cases, combined with an outcome-based selection test and the 'casing' principle (Ragin, 1992; King, Keohane & Verba, 1994; Yin, 2017). The data comprises both qualitative data on the idea contest design elements & choices of idea contest organizers, collected via semi-structured interviews, and quantitative data tracked from the Yambla idea management software platform which is used to digitally support the idea contests. Following the principle of equifinality and conjectural causation, idea contests design configurations that consistently resulted in high or low inflow of idea suggestions by employees are identified and discussed.

The paper contributes a configurational and holistic understanding on how idea contests can be organized to lead to higher levels of ideas suggested by employees. Whereas most of the extant research is based on single cases, this chapter contributes to the extant literature by examining an unprecedented research setting containing thirty-seven idea contest cases, organized at thirty-four firms, with variation in their idea contest design. Furthermore, the chapter provides a comprehensive overview on how to apply a fuzzy-set qualitative comparative case study analysis in accordance with standards of good

QCA practices (Schneider & Wagemann, 2010, 2012; Thomann & Magetti, 2017), which hopefully can inspire future research in the innovation management field to embrace the QCA methodology.

## *Chapter 2 – The role of feedback during the development of ideas in idea contests*

While the majority of the extant front end literature focuses predominantly on idea generation and selection, relatively few studies consider the development and elaboration of ideas during the innovation process. In chapter 2 of the dissertation, the focus is shifted towards idea development and elaboration by studying the stepwise progress of ideas in three idea contests. Here, we do test how; and under what conditions, feedback can stimulate and support the early development and elaboration of an idea.

Drawing from organizational feedback theory (Ilgen et al., 1979; Dodd & Ganster, 1996; Oldham & Cummings, 1996; Zhou, 1998; Shalley & Perry-Smith, 2001; Zhou & Shalley, 2003; Zhou, 2008) and extant research on feedback in the innovation front end (Wooten & Ulrich, 2017; Beretta, 2018; Zhu et al., 2018; Piezunka & Dahlander, 2019), hypotheses are build up that concern the relationship between feedback and idea development. In particular, we argue that the relationship between feedback and idea development depends on the nature of feedback (distinguishing between directive and motivational feedback) and certain organizational characteristics of feedback providers and recipients. To investigate the relation between feedback and idea development, survival modelling is applied to estimate the progress of ideas (n=395) at three idea contests organized on a yearly basis at Accenture Belux (2014-2016). The idea contests consist of a competitive process wherein employees from various departments, units and hierarchical positions submit and iteratively develop ideas that are evaluated and filtered out at multiple, consecutive gates, until only the few most promising ideas remain.

To operationalize the study, we classified the feedback interactions that occurred throughout the idea contests between employees in a qualitative and interpretive way, using multiple evaluators and validated with inter-rater agreement scores. Additionally, text content analyses were used in NVivo to quantify the similarity in text overlap between feedback messages, reporting Jaccard coefficients. Finally, the hierarchical rank of feedback recipient and feedback provider are captured and included as potential moderators. In particular, we test whether feedback is more likely to be internalized if feedback recipient and providers are positioned higher or lower in the hierarchical structure of the organization.

To enrich and exemplify the findings of the study, a detailed example of a winning idea is outlined, showcasing how the idea owner experienced the idea contest and how they used the feedback to develop and refine the idea during the idea contest.

The study contributes to the innovation front end literature as it highlights under what conditions feedback can stimulate the early development and enrichment of ideas during idea contests. Additionally, the study also contributes to feedback theory in the organizational literature field, as we reinforce a theoretical typology (Nadler, 1977; Zhou, 2008) that can be used to distinguish the nature of feedback and showcase how internal organizational characteristics of feedback providers and recipients, such as hierarchical position, can affect the reception of feedback during innovation processes (Reitzig & Maciejovsky, 2015; Keum & See, 2017). Additionally, the study hints at an unexplored mechanism in the feedback process of organizations which relates to the repetition of feedback.

### *Chapter 3 – The colour of hierarchy: a field experiment on hierarchical endorsements and idea selection decisions*

In the third and final chapter, the attention is shifted from idea generation and elaboration towards idea selection, and in particular how the organizational hierarchy of the firm, wherein the idea contest takes place, can affect the selection of ideas. The study reported in this chapter builds on extant literature on organizational hierarchy (Ibarra, 1993; Cardinal, 2001; Jansen et al., 2006; Reitzig & Maciejovsky, 2015; Bunderson et al., 2016; Keum & See, 2017) and investigates how the endorsement of an idea, defined as the (signal of a) positive valuation of an idea (McClean et al., 2021) can affect idea contest participants' willingness to select or reject ideas and how this effect is strengthened by the hierarchical position of the endorser in the organization. As such, the third chapter extends the front end literature by shedding light on the link between idea selection and idea endorsements (Reitzig & Sorenson, 2013; Criscuolo et al., 2017; Beretta, 2019) as well as providing new insights for the extant literature on organizational hierarchy.

The third study employs a real-life field experiment organized at a major European research university where we tested how endorsements given to ideas during an idea contest process affect idea selection decisions in function of the hierarchical rank of the endorser. A randomized block

experimental design with pre-test, post-test and post-treatment check is applied. The treatment used is the colour attributed to an endorsement sticker reflecting a certain hierarchical rank. The participants in the treatment group were informed at the start of the idea generation process what the colours mean when they receive their idea generation material, whereas the participants in the control group all received the same colour of endorsement stickers. Randomization of participants occurred via a blocked design: by splitting up organizational members into teams of four, but still within their education program committee (block). The education program committee teams were then randomized to either the control group or treatment group. Using the pre-test, post-test experimental design, we can observe whether participants modified their preferences for certain ideas before and after the endorsements are given. This allows us to check whether hierarchical endorsements affect hold (affirming initial judgements about an idea) or shift decisions (considering previously unconsidered ideas). The post-experiment survey is used to ask for informed consent, for a post-treatment check and a validity check. To analyse the results, we compare the treatment and control groups in terms of idea generation output, and hierarchical idea endorsements and we employ coarsened exact matching (CEM) as well as logit and ordered logistic regressions to check whether more weight is given to idea endorsements from a high hierarchical rank.

# Chapter 1

# How to Design Idea Contests to Improve Ideation Generation Performance[1]

## 1.1 Introduction

As a result of the widespread adoption of idea suggestion software platforms, companies have increasingly become enabled to involve crowds in the creative process to gather ideas, including their own employee workforces (MacCrimmon & Wagner, 1994; Van Dijk & van den Ende, 2002). As involving crowds in the creative process is a formidable task and can lead to an abundance of idea suggestions if handled correctly (Afuah & Tucci, 2012; Bayus, 2013; Brabham, 2015), companies have increasingly turned to setting up idea contests in order to organize and manage crowdsourcing (Morgan & Wang, 2010; Malhotra & Majchrzak, 2014). The idea contest has become a prominent manifestation of organizing for crowdsourcing in the corporate context, as it provides a structured process for collecting idea suggestions from large groups of actors and filtering out the ideas of lesser quality, until only the most promising ideas remain to be developed or commercialized (Terwiesch & Ulrich, 2009; Morgan & Wang, 2010; Adamczyk, et al., 2012; Nicolajsen et al., 2019).

The use of idea contests – also interchangeably labelled as idea competitions or crowdsourcing contests – has gained popularity over the past two decades in managerial practice. In parallel, a growing body of academic studies has emerged focused on how idea contests are organized or 'designed' in order to yield better outcomes, especially in terms of generating more ideas of higher quality (Morgan

[1] *An earlier version of this chapter has been presented at the Innovation and Product Development Conference in Antwerp (2020).*

& Wang, 2010; Adamczyk et al., 2012; Beretta et al., 2017; Nicolajsen et al., 2019). This growing strand of literature has highlighted several design elements of idea contests that need to be carefully managed in order to successfully crowdsource ideas. Considerable attention has been directed at several key design elements such as the rewards used to attract and incentivize idea contributors (Toubia, 2006; Morgan & Wang, 2010), the feedback interactivity between participants and moderators (Wooten & Ulrich, 2014; Zhu et al., 2017; Beretta, 2018) and the evaluation procedure used to select ideas (Terwiesch & Ulrich, 2009; Martinsuo & Poskela, 2011; Kruft et al., 2019). Less scholarly attention has been directed at other key design elements such as the formulation of the idea challenges (Piller & Walcher, 2006; Malhotra & Majchrzak, 2014), the promotional communication when broadcasting the idea contest (Lauro et al., 2013; Nicolajsen et al., 2019) or the timespan of soliciting ideas (Terwiesch & Ulrich, 2009; Bayus, 2013).

Generally, prior studies have focused their attention at one central design element at a time, therefore adding piece-by-piece to our understanding how the design of idea contests can affect their outcome. Yet, these design elements that constitute the idea contest are likely interdependent and might lead to different outcomes if combined (Rivkin & Siggelkow, 2003; Puranam et al., 2012; Dahlander et al., 2019). Adopting a configurational lens, we exploratively test in this study how central design elements of idea contests combine into different configurations, and how they are jointly, or disjointly, associated with high and low levels of idea generation (Meyer, Tsui and Hinings, 1993; Ordanini et al., 2014; Marx et al., 2015; Piekkari & Elch, 2016; Yin, 2017). For the selection and classification of design elements, we base ourselves on the recent crowdsourcing-process framework of Dahlander et al. (2019), where crowdsourcing is modelled as a four stage sequential process (define, broadcast, attract, select) and which highlights several central decisions an organizer needs to make. For our empirical study, we focus on the central decisions related to idea contest design an organizer needs to make *before* launching the idea contest. Therefore, we exclude any moderating actions (Beretta et al., 2018) or interventions (Nicolajsen et al., 2019) an organizer can make during the idea contest.

The contribution of this study is intended to a) disclose whether design decisions related to idea contest design are indeed interdependent on another (Rivkin & Siggelkow, 2003; Puranam et al., 2012; Dahlander et al., 2019) and b) to exploratively test which compositions of idea contest design perform

best or worst in terms of attracting idea suggestions from their employees (Archak & Sundararjan, 2009; Terwiesch & Ulrich, 2009; Girotra et al., 2010; Kornish & Ulrich, 2011).

To explore variations in idea contest design, we conceptualize thirty-seven idea contests as configurations of possibly interdependent design elements. The thirty-seven idea contests (the cases) are organized by thirty-four different firms located in the Benelux between 2012 and 2020. All the cases are internally organized idea contests where the employees serve as idea contributors and the idea collection is supported by an online idea suggestion platform. To exploratively investigate idea contest design of multiple cases, we apply a fuzzy-set qualitative comparative multi-case study approach. This method is chosen because it allows us to juxtapose different configurations of idea contest design and their consistency in producing (un)favourable idea generation performance outcomes, without restricting us to get a holistic and contextualized understanding of each case separately (Eisenhardt, 1983; King, Keohane & Verba, 1994; Eisenhardt & Graebner, 2007; Zahra, 2007). Rooted on the principles of causal complexity of the QCA method, the research objective of our multi-case study is three-fold: First, we aim to test how certain attributes (idea contest design elements) are combined (*conjunction*) to lead to a specific outcome (idea generation performance). Second, we want to identify every distinct idea contest design configuration that produces a certain idea generation outcome (*equifinality*). Thirdly, we aim to uncover which idea contest designs lead to success or failure in idea generation separately (*causal asymmetry*) (Ragin, 2009; 2014; Schneider & Wagemann, 2012; Marx et al., 2014; Ordanini et al., 2014).

The paper is positioned as an explorative study in the sense that we are testing the interdependency between different idea contest design elements in their ability to lead to high and low performance in idea generation. This is to our knowledge unprecedented in the idea contest design literature and the larger body of studies on crowdsourcing as it remains difficult to collect comparable data from a large variety of idea contests that also vary considerably in idea contest design. While the finite number of cases (n=37) in our sample does not allow us to make causal claims on the relationship between the (conjunction of) idea contest design elements and idea generation performance, we do hope that this study can serve as a roadmap to guide future research on the interdependencies of idea contest design

elements, as well as providing practitioners a blueprint on how to set up idea contests to reap more idea suggestions from the crowds of potential idea contributors.

The structure of the paper proceeds as follows: in section 2 we synthesize extant literature on idea contest design to provide a clear overview what design elements are central to the constitution of an idea contest. Section 3 provides an overview of the data collected, the case selection, the methodology application and the analytical procedure. Section 4 details our explorative fs-QCA analyses and results. In section 5 we discuss the results and several cases in more detail. Finally, we discuss the implications of our study for managerial practice and list the limitations of the study.

## 1.2 Literature overview

### 1.2.1 Organizing crowdsourcing through idea contests

As a consequence of the constant pressure to innovate, firms are continuously searching for new ideas to fuel their innovation pipelines (Afuah & Tucci, 2012; Dahlander et al., 2019). To search for, explore and identify more valuable opportunities and ideas, crowdsourcing has gained considerable prominence over the years as it allowed firms to scout for ideas beyond traditional organizational boundaries. On the one hand, crowdsourcing enabled firms to tap into the wisdom of crowds external to the organization (Piller & Walcher, 2006; Di Gangi et al., 2010; Poetz & Schreier, 2012), while on the other hand, crowdsourcing also enabled firms to tap into the knowledge and expertise of internal groups of potential idea contributors, transcending internal organizational boundaries such as departments, hierarchical layers and geographically dispersed jobsites (Ramus, 2001; Prather & Turrell, 2002; Van Dijk & Van den Ende, 2002; Erickson et al., 2012). Organizing crowdsourcing successfully has proven no easy feat, even to this day (Cooper & Edgett, 2008; Nicolajsen et al., 2019; Dahlander & Piezunka, 2020; Porter et al., 2020) as it constitutes a relatively different approach of organizing compared to conventional forms of collaboration (Von Hippel & Von Krogh, 2016; Dahlander et al., 2019). In search for a structured process for organizing and managing the crowdsourcing process, many companies turned to organizing idea contests (Terwiesch & Ulrich, 2009; Adamczyk et al., 2012).

Although the use of contests is not unfamiliar to managerial practice for incentivizing agents to engage in competitions for status, promotions, compensation or bonuses (Lazear & Rosen, 1981; Cason

et al., 2010; Bothner, et al., 2011; Connelly et al., 2013), its use for gathering and selecting ideas has only started to gain considerable popularity over the past two decades, largely enabled by the widespread adoption of corporate software platforms, which expanded the potential reach for activating crowds (Prather & Turrell, 2002; Boudreau et al., 2013; Dahlander et al., 2019) and the emergence of notorious crowdsourcing initiatives and success stories such as IBM's innovation jam, Threadless t-shirt logo design competition, Eriscsson's Idea Boxes or Pixar's movie pitch competition (Terwiesch & Ulrich, 2009; Ogawa & Piller, 2006; Bjelland & Wood, 2008; Beretta et al., 2018). An *idea contest* also interchangeably defined as innovation tournament (Terwiesch & Ulrich, 2009; Wooten & Ulrich, 2017), innovation contest (Adamcyzk et al., 2012; Malhotra & Majchrzak, 2014), idea competition (Piller & Walcher, 2006; Ebner et al., 2009; Nicolajsen et al., 2019), crowd contest (Boudreau & Lakhani, 2011) or tournament for ideas (Morgan & Wang, 2010) is a crowdsourcing process where ideas are generated and suggested by a crowd of idea contributors and those ideas are evaluated in a relative way to identify the best ideas (Terwiesch & Ulrich, 2009). Each idea contest follows a similar sequential process. In response to a call for ideas of the firm, contributors are invited to suggest ideas and submit these to a platform. Elicited ideas are then evaluated relatively and a few ideas – those that show the most promise – are distinguished and are then typically selected for development and implementation or commercialization (Terwiesch & Xu, 2008). An idea contest therefore lies at the core of the front end or the idea generation process as it is used to create a large pool of ideas and, in a competitive and relative fashion, extracts the most promising ideas from this pool (Markham, 2013; Van den Ende et al., 2015; Beretta, 2017).

### 1.2.2 Designing idea contests

When setting up an idea contest, organizers are faced with various choices that pertain to the design of the idea contest (Terwiesch and Ulrich, 2009; Morgan & Wang, 2010, Adamcyzk et al., 2012). A growing body of academic studies, characterized mostly by single case studies and several self-administered idea contest experiments, have highlighted certain design elements that are essential when organizing an idea contest and have shed light at the challenges involved when implementing them (Morgan & Wang, 2010; Malhotra & Majchrzak, 2014; Kumar & Raghavendran, 2014; Beretta et al.,

2017; Wooten & Ulrich, 2017; Nicolajsen et al., 2019). Yet, few studies have taken a more comprehensive and holistic overview of the design decisions that an organizer needs to decide on when setting up the idea contest. Based on a literature overview of the emerging idea contest literature stream, a first list of idea contest design elements was catalogued by Adamcyzk et al. (2012) – yet no connections were made between the design elements. A more recent exhaustive overview can be found in the conceptual study of Dahlander et al. (2019), who conceptualize the organizing of crowdsourcing – such as idea contests – as a sequential process consisting of four phases: define, broadcast, attract and select. Each phase is presented with its own set of decisions an organizer can make when organizing crowdsourcing. Building on this framework, we outline phase-by-phase the central design choices an organizer needs to make when organizing an idea contest.

#### 1.2.2.1 Defining the idea challenge

The sequential process of organizing for crowdsourcing starts with defining the opportunity or problem space for which ideas should be generated (Kornish & Ulrich, 2011; Dahlander et al., 2019). Most commonly, the organizer of an idea contest shares a challenge, which typically is a representation of a problem statement (Bingham & Spradlin, 2011).

In regards of the define phase, an organizer needs to make two decisions: how narrow or broad to specify each challenge in order to scope the search for ideas and whether ideas to search for are solution-related or problem-related. Solution-related ideas or opportunities relate to finding a solution to a problem, which can be both in response to a general or specific problem, whereas problem-related ideas ask the crowd to identify what problems should be addressed (Boudreau & Lakhani, 2012; Bayus, 2013; Dahlander et al., 2019). While problem-related ideas can be collected from internal crowds of employees as a form of bottom-up strategy formulation (Reitzig & Sorenson, 2013), problem-related ideas are, for the most part, collected from external groups such as users or customers (Von Hippel, 2005; Ogawa & Piller, 2006; Debruyne, 2014; Benon & Jansson, 2016). Internal crowdsourcing is typically directed at collecting solution-related ideas (Bjelland & Wood, 2008; Beretta et al., 2018), as employees hold relevant, yet dispersed knowledge on the products, activities and strategies of the organization that can help them to identify solution-related opportunities or ideas and develop them (Becker, 2001; Afuah & Tucci, 2012).

Another critical decision to make in the define phase is how to specify a crowdsourcing challenge of the idea contest (Fernandes & Simon, 1999; Dahlander et al., 2019). Challenge formulation can differ in topic specificity, ranging from general, unrestricted calls for ideas, that allow participants to submit any idea to an idea contest (e.g. tackling any kind of problem), to well-specified search fields (e.g. a solution to a specific problem area or topic) (Piller & Walcher, 2006). Broad, unrestricted call for ideas are suggested to result in more idea submissions (quantity) as the search field is larger and more wild ideas might be submitted since more ideas can qualify (Piller & Walcher, 2006; Boudreau et al., 2011; Kornish & Ulrich, 2011). Vice-versa, due to the general or unrestricted nature of the broad call for ideas, there is more uncertainty, resulting in less direction to which ideas can be submitted, which in turn may hamper the ability of employees to generate implementable ideas (Piller & Walcher, 2006). No empirical studies, to our knowledge, have shed light on the relationship between challenge specification and idea generation so far.

#### 1.2.2.2 Broadcasting the idea contest

The second phase centres around creating awareness of the idea contest by broadcasting it to the pool of potential idea contributors. Broadcasting the idea contest is arguably an essential part to consider when organizing an idea, as it can ascertain that a critical mass of idea contributors is reached, therefore likely resulting in more suggested ideas. Broadcasting the idea contest widely in the organization is also important as this can affect the diversity of participants that could join, who hold dispersed and diverse knowledge and information (Nelson & Winter, 1982; Shane, 2000; Becker, 2001). Prior research has proposed that a direct means to broadcast an idea contest is to establish *promotional communication* (Fairban & Williams, 2001; Lauro et al., 2013; Nicolajsen et al., 2019). Promotional communication of the idea contest can occur through a variety of means, media and channels, both online and offline or combined. Within the descriptive case studies many examples can be found such as email invitations, notifications, websites, blogs, social networking websites, promotional videos or through spreading gimmicks or posters in the organisation, or by giving formal presentations to announce the idea contest (Ebner et al, 2009; Witt et al., 2011; Blohm et al., 2016; Merz et al., 2016). So far, there is no empirical

evidence that links promotional communication exerted in idea contests with the number of participants suggesting ideas or with the amount of suggested ideas.

A second decision that an organizer needs to make when broadcasting an idea contest relates to setting a certain time-bound duration during which ideas can be solicited by idea contributors (*soliciting period*). On the one hand, a temporary, predefined idea soliciting period of a couple of weeks, sometimes months, can be used, or ideas can be solicited continuously throughout the year and entered into the idea contest process at a given time (Terwiesch & Ulrich, 2009; Bullinger et al., 2012; Bayus, 2013; Nicolajsen et al., 2019). Time-bound idea soliciting periods are advocated to create a certain momentum in the organization, possibly leading to more awareness about the idea contest and consequently resulting in more idea suggestions (Terwiesch & Ulrich, 2009). Allowing for continuous idea suggesting, on the other, is also argued by prior literature to positively affect idea generation, as it encourages idea contributors to keep suggesting new ideas, thus possibly creating serial idea contributors (Di Gangi & Wasko, 2009; Di Gangi et al., 2010; Bayus, 2013; Schemmann et al., 2017). Hence, prior literature has not provided a clear unambiguous prediction on how the soliciting period (time bound or continuous) of idea contests affects idea generation.

#### 1.2.2.3 Attracting participants and idea suggestions

After broadcasting the idea contest and its inherent idea challenges, the organizer needs to attract potential contributors to suggest ideas (Dahlander et al., 2019). A first decision the organizer typically decides upon is whether or not to use *rewards* to attract and incentivize idea contributors to participate in an idea contest (Adamcyzk et al., 2012; Boudreau et al., 2008; Bullinger et al., 2010; Ales et al., 2017; Körpeoğlu & Cho, 2018). Rewards are a longstanding and inherent mechanism to induce efforts from agents as shown by contest theory (Lazear & Rosen, 1981; Bothner, et al., 2011; Connelly et al., 2013) and generally the literature has distinguished between pecuniary and non-pecuniary rewards, weighing the benefits and pitfalls (Archak & Sundararajan, 2009; Morgan & Wang, 2010; Ales et al., 2017). When considering pecuniary rewards, the fixed winner-takes-all reward is a most commonly adopted mechanism in the set-up of idea contests as it is preferred when dealing with settings of high uncertainty (Terwiesch & Xu, 2008). In addition to the high uncertainty, the winner-takes-all reward is also encouraged by extant research when participants hold relatively similar levels of knowledge and

abilities (Morgan & Wang, 2010) or when participants are risk-neutral or risk-tolerant (Archak & Sundararajan, 2009). An alternative proposition related to the division of monetary rewards are to operate with performance-contingent rewards, where participants receive a proportion of their performance, or to spread out the reward over multiple top-ranked quality submissions, which is advised to do if participants are risk-averse or their ability vary in a significant degrees (Terwiesch & Xu, 2008; Archak & Sundararajan, 2009; Morgan & Wang, 2010).

Considerable attention has been devoted to the roles of pecuniary and non-pecuniary rewards in idea contests. Idea contest participants themselves have indicated that their inclination to join an idea contest are predominantly non-pecuniary in nature (Leimeister et al., 2009; Morgan & Wang, 2010). In general, idea contest participants have been shown to have three prime motives for participating: a) the opportunity to learn new knowledge and skills, b) profiling options and c) social recognition (Leimeister et al., 2009; Morgan & Wang, 2010). Social recognition and profiling are typically fostered by creating visibility about the participants accomplishments, either through communication channels of the organization (website, emails, newsletter,...) or by setting up a grand event or finals at the end of the idea contest, where the idea contributors of the most promising ideas can present their ideas to senior management and their fellow colleagues (Leimeister et al., 2009; Morgan & Wang, 2010). In addition, symbolic rewards can be used to provide recognition to the winners such as a trophy, employee of the month award or an editorial piece in the newsletter of the organization (Leimeister et al., 2009).

Whereas the aforementioned non-pecuniary rewards are targeted at evoking motives of social recognition and profiling, another motive for idea contest participants to participate in idea contests is to learn new knowledge and build up experience in developing ideas (Leimeister et al., 2009; Majchrzak & Malhotra, 2016). Since idea contests involve a multitude of agents or crowds in the creative process of the organization, many studies have pointed at feedback as a prime approach to foster learning and sharing of knowledge during idea contests (Adamczyck et al., 2011; Majchrzak & Malhotra, 2016; Wooten & Ulrich, 2017). Recent studies on the idea generation process indicate that feedback interactions can foster creative thinking, induce learning opportunities for idea contributors (Van Den Ende et al., 2014; Wooten & Ulrich, 2017; Beretta et al., 2017; Zhu et al., 2018; Piezunka & Dahlander,

2019). In particular, idea contests where feedback interactions occur have been shown to attract more idea contributors and solicit more consecutive idea suggestions from each participant (Wooten & Ulrich, 2017) and the generated ideas have been shown to result in heightened quality (Zhu et al., 2019). Furthermore, the ideas that receive feedback are more likely to be selected, at least if the feedback given to those ideas is framed positively (Beretta, 2019). Even the presence of negative feedback, although it decreases the probability for an idea to be selected when faced with it (Beretta, 2019), can increase idea contributor's willingness to submit other ideas. This is because the feedback can help the idea contributor to understand the rejection of their earlier idea, thus increasing their willingness and tendency to suggest other ideas (Piezunka & Dahlander, 2019).

When setting up an idea contest, an organizer needs to decide which actors or groups of actors are permitted to give feedback to the ideas. Yet, similarly as with idea suggestions, opening up the floor to a crowd for giving feedback does not necessitate that the crowd will give feedback. What an organizer can determine in advance is to install a predetermined *administrator team to give feedback* to each suggested idea (Beretta et al., 2018; Zhu et al., 2019).

#### 1.2.2.4 Selecting the most promising ideas

After attracting idea contributors to suggest ideas, the final phase consists of evaluating and selecting the ideas that are considered best in terms of originality and usefulness (Amabile, 1996; Dean et al., 2006). To identify and select the best ideas, the organizer needs to decide how to set up the *evaluation procedure* of an idea contest. This involves several decisions, related to the number of evaluation rounds to implement, what evaluation criteria to use when assessing the suggested ideas, and whether to involve the crowd in evaluating ideas (Terwiesch & Ulrich, 2009). First, deciding what number of rounds to use can strongly impact the efficiency (time to evaluate ideas) and accuracy of the evaluation of the ideas (selecting the best ideas) (Terwiesch & Ulrich, 2009). Idea evaluation and selection is a well-known and critical part of the creative process and has therefore received considerable attention from innovation scholars (Reitzig & Sorenson, 2013; Berg, 2016, Criscuolo, et al., 2017). Given the (likely) multitude of ideas that need to be evaluated, many idea contests work with jury panels to evaluate novelty and usefulness (Berg, 2016; Criscuolo et al., 2017). To balance the efficiency and accuracy of evaluation, Terwiesch & Ulrich (2009) argue in favour of implementing a

stage-gate typed of setup of evaluation rounds, where initial idea descriptions are kept short for an efficient evaluation at the start and idea descriptions become lengthier and more detailed to allow for accuracy in evaluations in later evaluation rounds. Most extant studies, to our understanding, have focused primarily on one-shot idea contests where the suggested ideas are only evaluated once and the winners are directly drawn from this group (Morgan & Wang, 2010; Wooten & Ulrich, 2017).

### 1.2.3 Towards a comparative and configurational examination of idea contest design

In this study, we advocate that the aforementioned design elements should not be decided upon in isolation, but rather be viewed as interdependent parts of a whole (Meyer, Tsui and Hinings, 1993; Ordanini et al., 2014; Marx et al., 2015; Piekkari & Elch, 2016; Yin, 2017). The extant literature has added piece-by-piece to our understanding how idea contest design elements are set-up, and only at times showed how design elements can affect idea generation outcome (Wooten & Ulrich, 2014; Malhotra & Majchrzak, 2014; Beretta et al., 2018; Piezunka & Dahlander, 2019; Zhu et al., 2019). Few studies have mentioned, let alone investigated, whether interdependencies exist between the design elements. This is largely because most studies have either investigated a single idea contest in a single organizational context (Piller & Walcher, 2006; Ebner et al, 2009; Beretta et al., 2018; Zhu et al., 2019; Porter et al., 2020) or investigated a single, self-organized idea contest as an experiment (Wooten & Ulrich, 2014; Malhotra & Majchrzak, 2014) with little to no variation in the design of the idea contests. Interdependencies between different design aspects were claimed important in the conceptual framework of Dahlander et al. (2019), who suggest that managing crowdsourcing potentially entails both a sequential and reciprocal interdependence between the design elements an organizer decides on. Building on this suggestion, we are interested to exploratively test whether we can observe certain interdependencies or conjectures between several design elements of idea contests.

To obtain and observe variation in idea contest design, two alternative approaches can be followed: examining a single idea contest that adapts its design over time or increasing the number of observed cases (King, Keohane & Verba, 1994). While we primarily focused on following the latter approach, the former was recently adopted by Nicolajsen et al. (2019), who investigated three consecutive idea contests at a single organization, highlighting the breakdowns that occurred and the design changes that

were implemented in response to each breakdown. In summary, the initial idea contest design was altered as follows: the challenges became more scoped by making the formulation more specific, the promotional communication was amplified to reach previously less represented business units, pecuniary and individual-based rewards were swapped for non-pecuniary rewards that emphasized social recognition, feedback from other employees became encouraged and more ideas were selected for further development in the evaluation procedure (Nicolajsen et al., 2019).

Although this case study sheds light on how idea contest designs can be altered over time in response to certain breakdowns, it did not identify interdependencies between the key design elements of idea contests, nor did it link idea contest design adaptations with idea generation outcomes. Due to the lack of empirical research about interdependencies between idea contest design elements, we position this study as an explorative test of how idea contest design elements combine together and how they are linked with idea generation performance. Following a comparative study of multiple cases, we are interested to uncover how key design elements combine into configurations of idea contest design, what type of configurations (or archetypes) are predominantly present in practice, and which idea contest design configurations lead consistently to success (or failure) in terms of idea generation. Our study is *configurational* in the sense that we conceptualize idea contest as a bundle of design elements that can be combined in different configurations, yet we investigate them as a holistic entity in relationship with idea generation performance (Ordanini et al., 2014; Ragin, 2014).

# 1.3 Data & Methodology

## 1.3.1 Research Sample

To investigate the way central design elements of idea contests combine into certain archetypes, and to make meaningful comparisons between high-performing and low-performing idea contests in terms of idea generation, we engage in convenience sampling by collecting data in close collaboration with Yambla, a leading idea management and execution software platform provider, headquartered in Brussels. Yambla holds a large share in the idea software platform business in Belgium and has been active since 2012. In this data collection endeavour, we assembled data from forty-two idea contests organized at thirty-eight firms, all using the Yambla platform. The benefit of collaborating with an idea

software platform provider such as Yambla for our empirical study pertains to the following three aspects: a) Yambla's platform stores detailed and easy-to-compare data on the idea generation levels of each firm, b) they are actively informed on the organization and set-up of the idea contests at their client firms, which gives them deep insight and understanding of each design elements and choices made by the organizing team of the idea contests and c) the idea management platform is customised for each client differently to accommodate their design choices when setting up the idea contest, yet keeping the overall look-and-feel of the platform constant over all cases.

### 1.3.2 Data Collection Procedure

We collected information from each company that made use of the platform for organizing crowdsourcing initiatives between 2012 and 2020 on a case-by-case basis in close collaboration with key representatives of the Yambla idea execution software platform. In a first step, the amount of ideas suggested to each idea contest, which serves as our prime outcome parameter of interest, are extracted directly from the stored database behind the Yambla idea management software platform. As a second step in the data collection procedure, we conducted semi-structured interviews on a case-by-case basis with the founders and responsible client manager of Yambla, in order to capture the design elements of each idea contest. The client manager and founders of Yambla were closely informed about the design of the idea contests at the organization of their clients, as they modified the platform in function of the idea contest design. They therefore have detailed knowledge and understanding on how each design element is set-up, as well as having an approximate overview of the different design configurations that exist. The interviews are conducted in a structured manner, mapping each central design element of interest with a checklist, so that no biased interpretation can occur. The interviews are complemented with unstructured questions to ensure that the research team has a rich and contextualized understanding of each firm and the idea contest organized therein.

To set up a valid and comparable multi-case sample, we perform a theoretical case sampling approach to adequately select only the cases within Yambla's client base that undeniably represent idea contests and we perform a sample selection test based on the outcome according to the principle of 'casing' (Ragin, 1992; King, Keohane & Verba, 1994; Yin, 2017). Casing is a central element of the

qualitative research process, where we carefully ensure that the elements under investigation belong to the same group, unit or 'case' (Ragin, 1992). The selection test based on the outcome was performed by investigating the number of suggested ideas per case, checking if there are any outliers in our sample and to question whether they are representable cases with outlier levels of the outcome (with extreme high or low levels of idea generation performance) or unrepresentable cases. Based on the platform's data and our interviews with Yambla client manager, we singled out one case with an unseemly high amount of generated ideas, ascertaining that the firm used the idea management platform to document trends, instead of solution-related ideas. In a similar way, we singled out three cases where almost no ideas were suggested on the platform. The extreme low outcomes were caused in two cases because the idea contest never had a formal kick-off since the company pulled out of the idea contest before its launch due to financial constraints. In another case, the organizer had announced that only a very small fraction of ideas would be selected, which resulted in close to zero spontaneous idea suggestions by the employees. Finally, we found for one case that all activity on the platform derived from one person, who used the platform to document his or her own ideas as a project portfolio map. Based on these insights, we discard these five cases. The thirty-seven remaining cases all fall under the umbrella of our focal concept, being idea contests where a crowd of internal organizational members generate and solicit ideas that in response to a broad call or specified challenge and where ideas are filtered out until the most promising ones remain (Terwiesch & Ulrich, 2009; Morgan & Wang, 2010; Beretta, 2017; Nicolajsen et al., 2019). The idea contests in our case sample all search for solution-related ideas (e.g. ideas that tackle or uplift a certain problem or opportunity). Although this is less commonplace in practice, idea contests can also be used to gather problem-related ideas, which relate to asking the crowd to identify problems that the organizer can address.

In table 2, we give background on the firm's characteristics (business size, sector, crowd size, amount of idea suggestions and our outcome variable (ideas per employee), this for each case separately.

The thirty-seven cases have an employee workforce between approximately 50 and 5000 employees, with a mean of 795 employees. There are six small-sized enterprises (< 50 employees), thirteen medium-sized enterprises (50 < 250 employees) and eighteen large-sized enterprises (> 250 employees). About half (45 percent) of the cases concern firms active in research and technology-

intensive sectors, including biochemistry, agriculture, medical, energy and ICT. The other half of the cases are active in low research and technology intensive sectors such as financial, HR or consulting services or in the consumer goods industries.

## 1.3.3 Data Preparation and Calibration

### 1.3.3.1 Outcome of interest: Idea generation performance

To capture and compare idea generation between idea contests as our outcome measure, we focus on the inflow of ideas, e.g. the amount of ideas suggested by employees. As brought forward in extant studies on the idea generation process, idea generation performance is determined by the amount of generated ideas, since the more ideas, the more likely some ideas will be exceptional - and the average quality of the generated ideas (Van Dijk & van den Ende, 2002; Terwiesch & Ulrich, 2009; Girotra et al., 2010; Larado, 2012; Wooten & Ulrich, 2014). Concretely, we track and capture the quantity of ideas that are being suggested by employees before any selection happens. We do so deliberately as this performance metric if unaffected by the evaluation phase of the idea contest. Idea contests conducted at various organizations tend to vary in the evaluation of ideas, as the number of selected ideas can change, different criteria are used to evaluate the quality of ideas and the standards and norms of the firm related to the quality of an idea might differ substantially (Reitzig & Sorenson, 2013; Criscuolo et al., 2017; Mueller et al., 2018; Kruft et al., 2019).

Table 2: Company background information

| Case N° | Sector | Business size (#employees) | Crowd size | Suggested ideas | Ideas per capita |
|---|---|---|---|---|---|
| 1 | ICT | Small | 84 | 80 | 0,95 |
| 2 | Consumer services | Medium | 151 | 170 | 1,13 |
| 3 | ICT | Large | 341 | 158 | 0,46 |
| 4 | ICT | Large | 617 | 166 | 0,27 |
| 5 | Aviation regulatory services | Small | 27 | 30 | 1,11 |
| 6 | (Bio)chemical | Small | 13 | 162 | 12,46 |
| 7A | Consulting Services | Large | 708 | 160 | 0,23 |
| 7B | Consulting Services | Large | 708 | 127 | 0,18 |
| 7C | Consulting Services | Large | 708 | 108 | 0,15 |
| 8 | Product & materials vendor | Medium | 50 | 4 | 0,08 |
| 10 | Energy | Medium | 194 | 505 | 2,60 |
| 11 | Financial services | Medium | 122 | 89 | 0,73 |
| 12 | Consumer goods | Medium | 229 | 49 | 0,21 |
| 13 | Consulting services | Small | 32 | 69 | 2,16 |
| 14 | Financial services | Small | 39 | 79 | 2,03 |
| 15 | Financial services | Small | 44 | 85 | 1,93 |
| 16 | Advertisement | Small | 66 | 12 | 0,18 |
| 17 | Publishing & legal services | Medium | 429 | 480 | 1,12 |
| 20 | HR services | Small | 40 | 7 | 0,18 |
| 21 | Financial services | Medium | 245 | 136 | 0,56 |
| 22 | (Bio)chemicals & agriculture | Large | 273 | 176 | 0,64 |
| 23 | ICT | Medium | 151 | 105 | 0,70 |
| 24 | Energy | Large | 651 | 384 | 0,59 |
| 25 | Call Centre Operator | Large | 268 | 51 | 0,19 |
| 26 | Energy | Large | 649 | 68 | 0,10 |
| 27 | ICT & Medical Image Technology | Large | 574 | 600 | 1,05 |
| 28 | Financial services | Medium | 102 | 25 | 0,25 |
| 29 | ICT | Large | 522 | 31 | 0,06 |
| 30 | Energy | Medium | 206 | 39 | 0,19 |
| 31A | ICT | Large | 277 | 235 | 0,85 |
| 31B | ICT | Large | 362 | 79 | 0,22 |
| 32 | Product & material vendor | Small | 61 | 41 | 0,67 |
| 33 | Wholesale vendor | Large | 371 | 114 | 0,31 |
| 35 | Beverages | Large | 890 | 180 | 0,20 |
| 36A | ICT | Large | 772 | 73 | 0,09 |
| 36B | ICT | Large | 772 | 306 | 0,40 |
| 37 | Food & beverages | Medium | 82 | 40 | 0,49 |

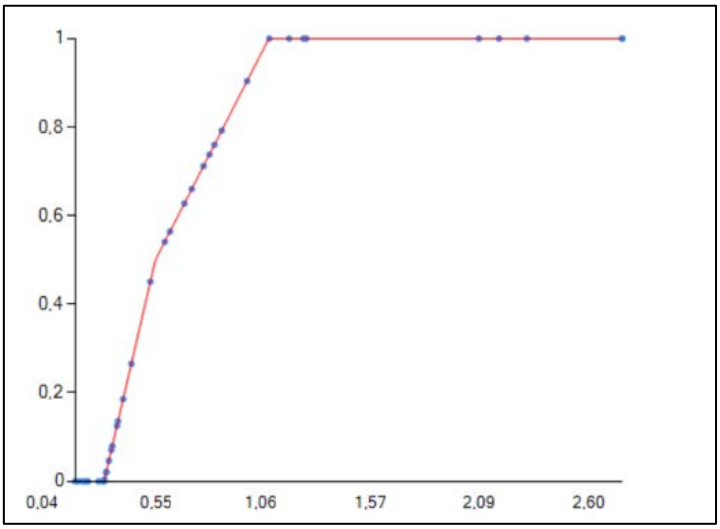
As we study thirty-seven idea contests organised at thirty-four organisations, comprising between fifty and five thousand employees, we logically consider the size of the group of employees who can submit ideas in the construction of our outcome variables. We do so by dividing the number of submitted ideas by the number of employees that are logged on the Yambla platform and can therefore submit ideas. We use the number of employees that register on the platform, rather than the entire firm populations size for the denominator, since some firms did not invite their entire workforce to participate in the idea contest (for instance employees of a specific country-based jobsite in an internationally global company or white-collar employees within a workforce). This percentage can thus equivalently be interpreted as the average of submitted ideas per capita.

### 1.3.3.2 Calibration of outcome measure

Before turning to the configurational analysis, fs-QCA requires us to transform the outcome parameter into calibrated sets. Calibration is the process in which empirical information of cases is used to set its membership scores to a certain outcome or condition, in between zero and one. A fuzzy set indicates whether a case has full membership (1), full non-membership (0) or lies in between with a cross-over point where values above 0.5 are more member than non-member and values beneath 0.5 are more non-member than member of that set (Fiss, 2011; Ragin, 2008; Schneider & Wagemann, 2010, 2012). As there are no prespecified ideal levels of 'high' or 'low' idea generation performance in terms of number of ideas per employee, we do not have theoretic thresholds at hand to decide a priori what a high or low performing idea contest should be. We therefore decide to rely on the collected data at hand to establish the upper bound (full-membership), lower bound (full non-membership) and crossover-point (point of maximum ambiguity) by applying the direct method of calibration as described by Ragin (2008). This method of calibration transforms the original idea quantity outcome values (mean = 0.94 | st.dev = 2.02) into fuzzy membership scores. Using a logistic function, the raw-data points are placed between three qualitative anchors: at 1 (full membership), 0 (full non-membership) and a cross-over point of maximum ambiguity (0.5) for our outcome parameter (Fiss, 2011; Ragin, 2008). Essentially, the cases are coded "1" if the idea contest is high-performing (a score >= 0.95, i.e. the 75$^{th}$ percentile or higher), and "0" if it has a low idea generation performance (an outcome <= 0.19 , i.e. the 25$^{th}$

percentile or lower). The cross-over point was set at 0.42, which relates to the 50th percentile of the number of idea submissions per capita, e.g. the cross-over point. The cases that fall between the 50th and 75th percentile are assigned a score between of 0.5 and 1, while the cases that fall between the 25th percentile and 50th percentile are assigned scores between 0 and 0.5 based on their relative position. Use of the percentiles to establish the anchor points can be found in prior empirical fs-QCA studies (e.g. Hofman, Faems & Schleimer, 2017). Below, we present a graph indicating for each case (bullet point) the original values of the outcome parameter (on the x-axis) and the calibrated fuzzy membership scores (on the y-axis) (see figure 1).

Figure 1: Calibration of outcome variable




### 1.3.3.3 Conditions: Idea contest design elements

Our study conceptualizes idea contests as configurations of interdependent design elements (i.e. core elements that constitute an idea contest). We describe below each central design element, the dichotomization procedure for each design element and we report the summary statistics and correlations between the conditions. An overview of the idea contest design elements can be found in table 3. To make meaningful comparisons between the cases, we focus our study on design choices that idea contest organizers have to decide upon *before* the launch of the idea contest (e.g. ex ante design choices). As such, we do not take into account any activities that organizers undertake during the duration of the idea contest, such as moderating idea progress or reacting to problems or breakdowns. For an overview of the role of moderators and adaptations during the idea contest, we refer to the work of Beretta et al. (2018) and Nicolajsen et al. (2019) who discuss those aspects in more detail.

For the 'define' phase, we use one design condition that captures the *formulation specificity of the challenge*. We do so by making a distinction between unrestricted, broad call for ideas, where any idea related to any topic or problem can be submitted versus well-specified challenges focusing on specific problems or opportunity areas (Piller & Walcher, 2006; Malhotra & Majchrzak, 2014). The cases where an open call for ideas is used are coded '1' while those with specific challenges are coded as '0'. Idea contests where there is both a broad call for ideas and specific challenges (18 cases) are coded as '1'.

For the second phase, broadcasting, we include two different design conditions. First, we make a distinction between temporary or continuous idea soliciting duration of the idea contests. As outlined previously, certain idea contests only have a limited duration when ideas can be suggested by employees, while others continuously keep the platform open so that ideas can be suggested at any given time during the year and are at a prespecified moment entered into the idea contest evaluation and elimination procedure. In this continuous format, the idea contest typically takes place in cycles (bi-annually or annually). The condition *idea soliciting period* is coded as '1' if the period when ideas can be shared is temporary and coded as '0' if the idea sharing period is continuous.

Secondly, we construct a condition for the *promotional communication* of the launch idea contest that distinguishes the presence (1) or absence (0) of a promotional effort to create awareness and attract organizational actors to the idea contest. To capture the promotional communication of the idea contest, we dichotomize based on the presence or absence of considerable promotional communication effort during the *launch* of the idea contest, as we are interested to capture the ex-ante design decisions to use promotional communication. Promotion of the launch of the idea contest include in our case sample a combination of some of the following promotional instruments: the use of flyers or posters, email invitations, websites, a promotional corporate video, gimmicks or artefacts (such as coffee cups or keychains with the link to the idea contest platform), formal presentation or announcement by management during offline event or occasion.

Table 3: Case overview of idea contest design

| **Phase** | **Define** | | **Broadcast** | | **Attract** | | |
|---|---|---|---|---|---|---|---|
| **Case N°** | ***Problem or solution-based*** | ***Challenge specificity*** | ***Soliciting period*** | ***Promotional communication*** | ***Non-pecuniary rewards*** | ***Pecuniary rewards*** | ***Administrator feedback team*** |
| 1 | Solution-related | Broad call | Continuous | Absent | Absent | Absent | Active |
| 2 | Solution-related | Broad call | Continuous | Absent | Absent | Absent | Active |
| 3 | Solution-related | Broad call | Continuous | Absent | Absent | Absent | Active |
| 4 | Solution-related | Well-specified challenges | Continuous | Absent | Absent | Absent | Active |
| 5 | Solution-related | Broad call | Continuous | Absent | Absent | Absent | Active |
| 6 | Solution-related | Broad call | Continuous | Absent | Absent | Absent | Active |
| 7A | Solution-related | Well-specified challenges | Temporary | Absent | Present | Absent | Active |
| 7B | Solution-related | Well-specified challenges | Temporary | Absent | Present | Absent | Active |
| 7C | Solution-related | Well-specified challenges | Temporary | Absent | Present | Absent | Active |
| 8 | Solution-related | Broad call | Continuous | Absent | Absent | Absent | Active |
| 10 | Solution-related | Broad call | Continuous | Absent | Present | Absent | Active |
| 11 | Solution-related | Well-specified challenges | Continuous | Present | Absent | Absent | Inactive |
| 12 | Solution-related | Broad call | Continuous | Absent | Present | Absent | Inactive |
| 13 | Solution-related | Broad call | Continuous | Absent | Absent | Absent | Active |
| 14 | Solution-related | Broad call | Temporary | Absent | Absent | Absent | Active |
| 15 | Solution-related | Well-specified challenges | Temporary | Present | Present | Absent | Inactive |
| 16 | Solution-related | Well-specified challenges | Continuous | Absent | Absent | Absent | Active |
| 17 | Solution-related | Broad call | Continuous | Present | Absent | Absent | Active |
| 20 | Solution-related | Well-specified challenges | Continuous | Absent | Absent | Absent | Active |
| 21 | Solution-related | Broad call | Continuous | Present | Present | Absent | Active |
| 22 | Solution-related | Well-specified challenges | Continuous | Absent | Present | Absent | Active |
| 23 | Solution-related | Broad call | Continuous | Absent | Present | Present | Active |
| 24 | Solution-related | Well-specified challenges | Continuous | Absent | Present | Absent | Active |
| 25 | Solution-related | Well-specified challenges | Continuous | Absent | Absent | Absent | Active |
| 26 | Solution-related | Well-specified challenges | Continuous | Absent | Present | Absent | Active |
| 27 | Solution-related | Broad call | Continuous | Present | Present | Present | Active |
| 28 | Solution-related | Broad call | Continuous | Absent | Absent | Absent | Active |
| 29 | Solution-related | Broad call | Temporary | Absent | Present | Absent | Inactive |
| 30 | Solution-related | Well-specified challenges | Continuous | Absent | Present | Absent | Active |
| 31A | Solution-related | Well-specified challenges | Temporary | Absent | Present | Present | Active |
| 31B | Solution-related | Well-specified challenges | Continuous | Absent | Absent | Absent | Active |
| 32 | Solution-related | Well-specified challenges | Continuous | Absent | Absent | Absent | Active |
| 33 | Solution-related | Broad call | Temporary | Present | Present | Present | Active |
| 35 | Solution-related | Well-specified challenges | Temporary | Absent | Present | Absent | Active |
| 36A | Solution-related | Broad call | Continuous | Absent | Present | Present | Inactive |
| 36B | Solution-related | Well-specified challenges | Temporary | Present | Present | Present | Inactive |
| 37 | Solution-related | Well-specified challenges | Temporary | Absent | Present | Absent | Inactive |

Related to the third phase, attracting participants and idea suggestions, we create two conditions related to the usage of *rewards*, and one for the support of feedback. Concerning the rewards, we outline the cases where rewards (both pecuniary and non-pecuniary) are used to attract idea contributors to the idea contest. The condition 'rewards' is dichotomously constructed as follows: if no rewards are used in an idea contest, the condition takes a value of '0'. If rewards are used, the condition receives a value of '1'. Rewards used in the cases can consist of (a combination of) any of the following: cash prize for the winner(s) to spend as they please, monetary resources for a team to develop an idea, access to a particular training or education program, a subscription to an online training program or magazine, or recognition-based rewards such as an idea contest cup, an article or interview in the company's magazine or on the website or an employee(s) of the month reward. A second condition is added, where we separate pecuniary and non-pecuniary rewards (Leimeister et al., 2009; Morgan & Wang, 2010) to check which one occurs the most and to test which one is the most successful in attracting participants and idea suggestions.

Since feedback has been shown to be a most prominent approach to evoke learning for participants, we are also interested to check whether the presence of feedback attracts more participants and idea suggestions. To incorporate feedback as an ex ante design condition, we cannot rely on the feedback given by the employee workforce, as this cannot really be forced by the organizer. What the organizer can decide in advance is to employ an *administrator* team with the task of giving *feedback* in a structured manner to all suggested ideas. In our dichotomization procedure, we attribute a '1' if there is an active administrator team in place, giving feedback at least once to every suggested idea. The cases where there is less than one administrator feedback message per idea are given a value of zero.

We explicitly decide not to include the evaluation procedure of idea contests in our analysis, since the evaluation procedure only happens after the suggestions of ideas are entered in the idea contest. The evaluation procedure can affect the amount of ideas that will be selected or not at the end of the idea contest, but it does not affect the inflow of ideas into the idea contest.

An overview of the key design elements in this study can be found in table 4 where we present the list of the conditions and our outcome parameter, denoting their mean, calibration step, presence and

Table 4: Key design elements and summary statistics

| **Variables** | Mean | S.D. | Min | Max | Type | Dichotomization/Calibration |
|---|---|---|---|---|---|---|
| *Outcome* | | | | | | |
| Amount of idea submissions/employees | 0.965 | 2.043 | 0.059 | 12.461 | Continuous | Direct method of calibration |
| *Design elements* | | | | | | |
| *Define* | | | | | | |
| Type of ideas | 1.000 | 0.000 | 1 | 1 | Dichotomous | Problem-related ideas = 0 \| Solution-related ideas = 1 |
| Challenge formulation specificity | 0.459 | 0.505 | 0 | 1 | Dichotomous | Specific idea challenges = 0 \| Broad, unrestricted call = 1 |
| *Broadcast* | | | | | | |
| Idea soliciting period | 0.342 | 0.481 | 0 | 1 | Dichotomous | Temporary idea sharing = 1 \| continuous idea sharing = 0 |
| Promotional communication | 0.297 | 0.463 | 0 | 1 | Dichotomous | Absence = 0 \| Presence = 1 |
| *Attract* | | | | | | |
| Rewards | 0.514 | 0.506 | 0 | 1 | Dichotomous | Absence = 0 \| Presence = 1 |
| Pecuniary rewards | 0.184 | 0.393 | 0 | 1 | Dichotomous | Absence = 0 \| Presence = 1 |
| Non-pecuniary rewards | 0.514 | 0.506 | 0 | 1 | Dichotomous | Absence = 0 \| Presence = 1 |
| Administrator feedback | 0.703 | 0.463 | 0 | 1 | Dichotomous | Less than 1 administrator feedback message per idea = 0 \| More than 1 administrator feedback message per idea = 1 |

*N° of cases = 37*

absence in the case sample. Based on the summary statistics and case data matrix, we can report what design elements occur most frequently and which configurations are most prominent in our case sample. Firstly, about half of the cases implemented rewards in their idea contest. Nineteen of the thirty-seven cases used rewards to attract idea contributors, from which six cases involved the use of monetary rewards. The thirteen remaining cases all strictly used non-monetary rewards such as recognitive and symbolic awards. Second, seventeen cases have made use of a broad call for ideas. The other twenty cases used specific challenges to focus the idea generation activities in their idea contest. Eleven out of the thirty-seven cases made active significant efforts to promote the launch of the idea contest, whereas twenty-six did not. We further observe that many cases use continuous idea sharing periods in order to collect ideas from their employees. Twelve cases used a temporary idea sharing period. Twenty-six cases have an active administrator feedback team in place who have actively given feedback at least once to each suggested idea on the platform, whereas eleven cases did not. Furthermore, in table 5, we present the correlations between our key variables.

Table 5: Correlation matrix

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| *Idea submissions/employees (dv)* | 1 | | | | | | | |
| *Broad call for ideas* | 0.278 | 1 | | | | | | |
| *Temporary idea soliciting period* | -0.120 | -0.291 | 1 | | | | | |
| *Promotional communication* | -0.088 | -0.243 | 0.054 | 1 | | | | |
| *Rewards* | -0.187 | -0.187 | -0.443 | 0.396 | 1 | | | |
| *Pecuniary rewards* | -0.087 | 0.182 | 0.165 | 0.195 | 0.428 | 1 | | |
| *Non-pecuniary rewards* | -0.187 | -0.187 | -0.443 | 0.396 | 1.00 | 0.428 | 1 | |
| *Administrator feedback* | -0.231 | 0.230 | -0.054 | 0.035 | -0.041 | -0.034 | -0.041 | 1 |

## 1.3.4 Fuzzy-Set Qualitative Comparative Analysis

We apply fuzzy-set qualitative comparative analysis (fs-QCA) to examine how idea contest design elements combine into configurations and how each configuration produces certain idea generation outcomes in a consistent manner (Ragin, 2008; Schneider & Wagemann, 2012). The fs-QCA approach enables us to construct a systematic and comparative analysis of cases, where each case is

conceptualized as combination of attributes and where different arrangements of attributes lead to different outcomes (Fiss, 2007; Soda & Furnari, 2012; Schneider & Wagemann, 2010). Fs-QCA allows us to investigate how the effect of certain attributes (in our case idea contest design elements) on a specific outcome (idea generation performance) depend on how the attributes are combined, rather than on their singular presence (Ordanini et al., 2014).

Each standard fs-QCA analysis follows two analytical steps: constructing a truth table and logically minimizing the truth table to identify the solution paths that can lead to a certain outcome (Schneider & Wagemann, 2012). A truth table presents all the logically possible configurations of conditions (rows) and the presence or absence of each condition (columns) in those configurations. To construct the truth table, we first identify all the logically possible configurations, which are $2^5$ rows, as we have a total of five conditions. Secondly, all cases present in our sample, and their respective conditions are attributed to the configurations. Since the conditions are dichotomous in nature, the construction of the truth table is fairly easily as we indicate either the presence or absence of a condition (for instance for the use of rewards) or we make a qualitative distinction between two options (for instance the use of a temporary (1) or a continuous (0) idea sharing period).

To finalize the construction of the truth table, we add the outcome value for each row. We do this by determining how consistent the cases in a row produce a high-performing or low-performing outcome, e.g. the extent to which the cases characterized by a certain configuration are members of the high-performing or low-performing cases. This value is computed as the consistency score of each configuration or row in the truth table. The consistency score is the sum of the membership value of each case in both the configuration and the outcome divided by the membership values in the configuration (Schneider & Wagemann, 2012). The consistency score therefore can be interpreted as a percentage denoting to what extent the cases, that are characterized by a certain configuration, are also members of a given outcome. In other words, the consistency score indicates to what extent a certain idea contest design configuration is also part of the high performing or low performing cases. We compute consistency scores separately for determining membership in high idea generation performance and for membership in low idea generation performance following the asymmetry principle of QCA.

In the second analytical step of fs-QCA, we start to analyse the truth table by considering each row as a statement of sufficiency. Based on the consistency value, we can determine whether a row is sufficient for the outcome or not sufficient based on a test of sufficiency. Tests of sufficiency relate to applying a minimum consistency threshold to each row, where a row (or configuration) is deemed sufficient if the consistency score is equal or higher than 0.80. In this way, we use the threshold to reduce the set of configurations (rows) that produce a particular solution (high or low idea generation performance) (Ragin, 2008; Fiss, 2011; Greckhammer, 2016). Given the fact that no universally accepted minimum threshold exists, the lack of upfront theoretical expectations on the how conditions combine to result in a certain idea generation outcome, and the exploratory nature of the study, we use a generally recommended threshold of 0.80 (Ragin, 2008; Fiss, 2011; Schneider & Wagemann, 2012; Misangyi & Acharya, 2014; Hofman et al., 2017). In robustness checks, we heighten this threshold to test the rigidity of our findings.

Since we have a limited set of cases and are interested in all possible idea contest design configurations, not only the most ones that occur most frequently, we set the frequency cut-off point to 1 case, which is generally recommended for studies with relatively small to medium sized samples (Schneider & Wagemann, 2012; Greckhammer et al., 2013, Hofman et al., 2017). This simply implies that no empirical information from our case sample is lost in the logical minimization process.

To logically minimize the statements of sufficiency, we use Boolean simplification rules and logic to uncover a solution formula. Starting with the list of configurations and conditions for which sufficiency has been confirmed (e.g. each row with a consistency score higher than 0.80), we search for matching conjunctions and for redundant conditions and configurations. Minimizing entails that when two truth table rows yield the same outcome but differ in one condition only, that this condition is logically redundant, and can be omitted from the solution formula (Schneider & Wagemann, 2012). Based on this process, we can uncover several solution paths, which are the configurations that consistently produced a certain idea generation outcome (equifinality). This analysis occurs separately for high and a low idea generation outcome (causal asymmetry). Although QCA allows for incorporation of unobserved configurations that are not in the data, we restrict ourselves to only report

the conservative solution without making any simplifying assumptions about unobserved configurations or remainders (Ragin, 2008; Schneider & Wagemann, 2012; Parida et al., 2017).

We report for each solution path its raw consistency, as well as for all the paths in the solutions together (solution consistency). While consistency establishes the presence of certain configurational solution paths in the empirical data, we also indicate the percentage of cases that rely on a certain design configuration to achieve an outcome by reporting the coverage scores. Concretely, coverage scores express how much of the outcome is covered by a certain single solution path (raw coverage), and how much of the outcome is covered by all the solution paths together (solution coverage). There is no threshold for coverage scores, it merely shows how empirically present a certain configurational path is in our data sample (Schneider & Wagemann, 2010).

# 1.4 Results

## 1.4.1 Prominent idea contest design configurations

To examine how conditions combine into configurations, we construct the truth table, which is the first step of the fs-QCA analysis. In total, there exist $2^5$ (32) logically possible idea contest design configurations of which we empirically observe seventeen configurations in our case sample. The presence of unobserved configurations comes as no surprise, as social phenomena tend to be limited or unequally spread in their empirical diversity (Schneider & Wagemann, 2012). In fact, given the medium-sized samples for which QCA is typically used, we arguably find considerable diversity in terms of idea contest designs configurations, attesting to the large variety in the set-up or design of idea contests in practice. The unobserved configurations, or remainders, are not shown in the truth table, and therefore also not used for further analytical steps. The resulting truth table can be found in table 6.

From the seventeen empirically identified idea contest design configurations, eight of the configurations are represented by more than one case. The most prominent idea contest design (n=6) in our data set is configuration G, incorporating idea contests where specific challenges are used, as well as a continuous idea sharing period, where there are no rewards or launch promotion, but an active administrator feedback team is in place. The second most represented configuration (n=4) in our sample is configuration H, which is closely similar to configuration G, with the difference being the use of

rewards to attract idea contributors. Configurations D, L and J are all represented by four cases. Configuration J entails three idea contests that were organized by the same firm though, who organized three consecutive idea contests between 2014 and 2016 without altering the idea contest design.

### 1.4.2 Determining configurations with consistent high and low idea generation inflow

In the second step of the fs-QCA analysis, we identify which rows are deemed sufficient paths to the outcome using a consistency threshold of 0.80 and logically minimize them to yield the solution formulas (Fiss, 2011; Greckhamer, 2016; Ragin, 2008).

Based on the consistency threshold, we highlight the truth table the rows in a light blue shade if that configuration is deemed a configurational path leading to high-performance, e.g. the configurational path has an outcome equal to or above 0.80. Configurations M, N, O and P are all shown to be consistent high-performing configurations, as the consistency scores are higher than 0.80 in each row. We do so as well for those configurations that are deemed consistent for a low outcome with red-coloured letters. Configurations E, F, G and I are configurations with consistency scores higher than 0.80 when analysing which configurations led to low performance in amount of suggested ideas. Next, we logically minimize the truth table rows, resulting in the identification of a number of solution paths that are found to consistently produce the outcome (Fiss, 2011; Greckhamer, 2016; Ragin, 2008). The identified configuration rows are then simplified by reducing redundant conditions between them using the simplification rules of Boolean logic. To report the solutions, the notation of Ragin & Fiss (2008) is used, which denotes the presence or the value of 1 of a condition with a black circle and the absence or the value of 0 of a condition with an empty circle. At the right-hand side of the solution tables, we report the consistency and coverage scores for each identified configurational path, as well as for the overall solution.

Table 6: Truth table

| Config. | Broad call for ideas | Temporary idea soliciting period | Promotional communication | Rewards | Administrator feedback | Consistency (high perform) | Consistency (low perform) | High performance | Low performance | CaseID |
|---|---|---|---|---|---|---|---|---|---|---|
| Config. A | 0 | 0 | 1 | 0 | 0 | 0.792 | 0.208 | 0 | 1 | 11 |
| Config. B | 0 | 1 | 0 | 1 | 0 | 0.564 | 0.436 | 0 | 0 | 37 |
| Config. C | 0 | 1 | 1 | 1 | 0 | 0.726 | 0.275 | 0 | 0 | 15, 36B |
| Config. D | 1 | 0 | 0 | 0 | 0 | 0.750 | 0.250 | 0 | 0 | 1, 5, 6, 8 |
| Config. E | 1 | 0 | 0 | 1 | 0 | 0.035 | 0.965 | 0 | 1 | 12, 36A |
| Config. F | 1 | 1 | 0 | 1 | 0 | 0.000 | 1.000 | 0 | 1 | 29 |
| Config. G | 0 | 0 | 0 | 0 | 1 | 0.171 | 0.8286 | 0 | 1 | 4, 16, 20, 25, 32, 31B |
| Config. H | 0 | 0 | 0 | 1 | 1 | 0.348 | 0.652 | 0 | 0 | 24, 26, 30, 22 |
| Config. I | 0 | 1 | 0 | 0 | 1 | 0.046 | 0.954 | 0 | 1 | 35 |
| Config. J | 0 | 1 | 0 | 1 | 1 | 0.257 | 0.743 | 0 | 0 | 31A, 7A, 7B, 7C |
| Config. K | 1 | 0 | 1 | 1 | 1 | 0.627 | 0.372 | 0 | 0 | 21 |
| Config. L | 1 | 0 | 0 | 0 | 1 | 0.669 | 0.331 | 0 | 0 | 2, 3, 13, 28 |
| Config. M | 1 | 0 | 0 | 1 | 1 | 0.879 | 0.120 | 1 | 0 | 10, 23 |
| Config. N | 1 | 0 | 1 | 0 | 1 | 1.000 | 0.000 | 1 | 0 | 17 |
| Config. O | 1 | 0 | 1 | 1 | 1 | 1.000 | 0.000 | 1 | 0 | 27 |
| Config. P | 1 | 1 | 0 | 0 | 1 | 1.000 | 0.000 | 1 | 0 | 14 |
| Config. Q | 1 | 1 | 1 | 1 | 1 | 0.265 | 0.7348 | 0 | 0 | 33 |

*Light-blue shade for high performing cases, red colour letters for low performing cases* *Consistency threshold = 0.80, frequency threshold = 1*

## 1.4.3 Overview of the high idea generation design configurations

Table 7 outlines the idea contest design configurations that consistently produced high levels of idea generation. Three configurations of idea contest design are identified, who consistently produced a high idea generation outcome, all brandishing a raw consistency value of 0.91 or higher. Taken together, the solution consistency centres around 0.95, which is a relatively high consistency of the identified solutions, and a solution coverage of 0.27, indicating that 27 percent of high performance in our sample is represented by these identified configurations. The first identified configurational path in the fs-QCA solution represents an idea contest design where a broad call for ideas is used to define the idea challenge, where a continuous idea sharing period is used to collect ideas, where rewards are used to attract employees to participate and where the administrator team is actively giving feedback to each idea (raw consistency score = 0.91). The second configurational path is also characterized by a broad call for ideas, a continuous idea sharing period and an active administrator feedback team. What differs here is that a considerable promotional communication was used when launching the idea contest (raw consistency score = 1). The third identified configurational path also entails the broad call for ideas and the active administrator feedback team but differs in the sense that no rewards or promotional communication was used. In this configuration though, the continuous idea sharing period has been replaced by a temporary idea sharing period (raw consistency score = 1). The raw coverage of the configurational paths is located between 5.6 and 15.5 percent, indicating the percentage of the cases that relied on the identified idea contest design to lead to high performance, giving an indication of the relative prominence of that solution path in our case sample.

Table 7: fsQCA solution paths for high performance

| Solution path | Broad call for ideas | Temporary idea soliciting period | Promotional communication | Rewards | Administrator feedback | Raw Consistency | Raw Coverage |
|---|---|---|---|---|---|---|---|
| Path 1 | ● | o | | ● | ● | 0.9199 | 0.1559 |
| Path 2 | ● | o | ● | | ● | 1.000 | 0.1130 |
| Path 3 | ● | ● | o | o | ● | 1.000 | 0.0565 |

Consistency threshold = 0.80 / Frequency threshold = 1

● = presence of condition
o = absence of condition

## 1.4.4 Overview of the low idea generation design configurations

Similar, we perform the fs-QCA for the idea contest design configurations with low levels of idea generation outcomes, e.g. those that did not succeed in receiving many idea suggestions. We report the solution formulas in table 8. As the results show, we identify two configurations that were linked with low idea generation levels. The identified solution paths together have a solution consistency of 0.88 and a solution coverage of 0.46, indicating that 46 percent of low performance in our sample can be explained via the identified paths.

The first configuration entails those idea contests that used specific idea challenges, which did not make a promotional effort to broadcast the launch of the idea contest, but which did have rewards and an active administrator feedback team in place (raw consistency score = 0.85). The second configurational path depicts the idea contests where a broad call for ideas is used, also no promotional effort to broadcast the idea contest was done, where there are no rewards and no active administrator feedback team present (consistency score = 0.97). The first configurational path has a raw coverage of about 0.31, which is about double of the coverage of the second identified path (coverage score = 0.15).

Table 8: fsQCA solution paths for low performance

| Solution path | Broad call for ideas | Temporary idea soliciting period | Promotional communication | Rewards | Administrator feedback | Raw Consistency | Raw Coverage |
|---|---|---|---|---|---|---|---|
| Path 1 | o | | o | • | • | 0.8465 | 0.3070 |
| Path 2 | • | | o | o | o | 0.9764 | 0.1518 |

Consistency threshold = 0.80 / Frequency threshold = 1

• = presence of condition
o = absence of condition

## 1.4.5 Sensitivity tests

To check for the robustness of our results, we follow a number of suggestions as proposed by Schneider & Wagemann (2012). Fs-QCA results are deemed robust if the findings related to the identification of sufficient and necessary conditions and configurations remain roughly the same when the analytical decisions, such as the calibration procedure and the consistency threshold, are altered.

First, we replicated the fs-QCA analyses using higher consistency thresholds (Schneider & Wagemann; 2012; Magetti & Levi-Faur, 2013). We raised the consistency threshold to 0.85. Raising the consistency threshold results in no dropping of configurational solution paths for computing the high or low idea generation performing cases.

Secondly, we altered the calibration procedure for our outcome parameter as follows. We recoded the outcome of a case as "1" if the idea contest is above the 80th$^{th}$ percentile or higher, and "0" if it has an outcome placed below the 20$^{th}$ percentile or lower. The cross-over point remains at the median, which is at 0.42, which relates to the 50$^{th}$ percentile of the number of idea submission per capita, e.g. the cross-over point. The cases that fall between the 50$^{th}$ and 80$^{th}$ percentile are assigned a score between 0.5 and 1, while the cases that fall between the 20$^{th}$ percentile and 50$^{th}$ percentile are assigned scores between 0 and 0.5 based on their relative position. Results of these analyses do not alter the identified solution configurations in a significant way.

## 1.5 Interpretation and discussion of results

Based on the suggestion that, when setting up or designing an idea contest in order to solicit ideas from crowds of actors, design choices should not be considered in isolation, but as interdependent parts of a whole (Dahlander et al., 2019), the objective of this study is two-fold: a) to uncover what design elements are indeed interdependent on each other and b) to exploratively test out which configurations of idea contest design appear to consistently result in high or low idea generation levels. The fs-QCA results above provide preliminary evidence that a single idea contest design element is not sufficient, by itself, for reaching a high level of idea generation. In a similar vein, we also find that the absence of a single design element does not explicate failure in generating sufficient ideas. All identified configurational paths presented in the high and low performance solutions consist of a conjunction of at least three design elements. This supports the general suggested notion that idea contest design elements should be considered in combination, not isolation, when setting up an idea contest, especially if the intention is to succeed (or at least not fail) at generating sufficient idea suggestions from the potential pool of idea contributors. While the solution supports the interdependency claim of design

elements, the identified configurations in the fs-QCA results merit further attention and discussion in order to extract further insights.

### 1.5.1 Distinguishing between pecuniary and non-pecuniary rewards

In the idea contest literature, a general distinction is typically made between pecuniary and non-pecuniary rewards (Terwiesch & Xu, 2008; Archak & Sundararajan, 2009; Morgan & Wang, 2010). So far, we did not distinguish between both types of rewards. Yet, the fs-QCA results do not show a straight-forward relationship with idea generation performance, as rewards have been present and absent in both the high and low performing idea contest design configurations. For those cases that implemented rewards to attract idea contest participants (n=25), most cases relied on non-pecuniary rewards (n = 20). Only five cases implemented pecuniary rewards and did so always in combination with non-pecuniary rewards. To check whether including pecuniary rewards differently affect idea generation, we substitute the previous rewards condition with a '*pecuniary rewards*' condition, indicating the presence of pecuniary rewards with a '1' and the lack of it with '0'. We report the solution in table 9 for high performance and in table 10 for low performance, respectively.

Table 9: fs-QCA solution paths for high performance (with pecuniary rewards)

| Solution path | Broad call for ideas | Temporary idea soliciting period | Promotional communication | Pecuniary rewards | Administrator feedback | Raw Consistency | Raw Coverage |
|---|---|---|---|---|---|---|---|
| Path 1 | ● | o | ● | | ● | 1.0000 | 0.1130 |
| Path 2 | ● | ● | o | o | ● | 1.0000 | 0.0565 |
| Path 3 | o | ● | ● | o | o | 1.0000 | 0.0565 |
| Path 4 | ● | ● | o | o | ● | 0.9041 | 0.0511 |

Consistency threshold = 0.80 / Frequency threshold = 1

● = presence of condition
o = absence of condition

Table 10: fs-QCA solution paths for low performance (with pecuniary rewards)

| Solution path | Broad call for ideas | Temporary idea soliciting period | Promotional communication | Pecuniary rewards | Administrator feedback | Raw Consistency | Raw Coverage |
|---|---|---|---|---|---|---|---|
| Path 1 | o | | o | o | ● | 0.8800 | 0.4560 |
| Path 2 | ● | ● | o | o | o | 1.0000 | 0.0518 |
| Path 3 | ● | o | o | ● | o | 1.0000 | 0.0518 |

Consistency threshold = 0.80 / Frequency threshold = 1

● = presence of condition
o = absence of condition

The substitution of rewards for pecuniary rewards does not provide a clear relation with idea generation performance, as it appears that the presence as well as absence of monetary rewards are both in the configurational paths linked with high and low idea generation performance in the conservative solutions. Even more so, the uncovered solution is more complex than the one previously identified, suggesting that pecuniary rewards do not have a straight-forward relation with idea generation performance. We therefore focus on the previous set of results, where rewards include both pecuniary and non-pecuniary elements, to draw conclusions on idea contest configurations.

## 1.5.2 What idea contest design elements conjugate together to result in high idea generation?

Based on the fs-QCA solution for high idea generation cases (table 7), several key patterns can be derived. First, each of the three identified configurations in the high-performance solution displays the combination of both an administrator team actively giving feedback to ideas, as well as a broad call for ideas to define the idea challenge. Since each high-performing case in the high-performance solution includes this combination of design elements, this conjunction might qualify as a necessary conjunction of design elements for obtaining high performance in idea generation quantity. Although a direct test of necessity[2] seems to confirm the possibility that this combination could be necessary for reaching high idea generation performance, we are in fact dealing with a false necessary claim. False necessary claims are a common fallacy in fs-QCA, which can occur when necessary statements are postulated based on the identified configurations that are actually sufficient for the outcome (Schneider & Wagemann, 2010). If we take a closer look at the truth table, there are actually two rows (configurations L & Q) that include the presence of both design elements and who do not abide to the threshold of high performance. Take for example configuration L in the truth table. This configuration does have both a broad call for ideas and administrator feedback team present, yet it does not surpass the minimal threshold, so it is not

[2] *A 'direct test of necessity' is computed through calculating the necessity consistency score of the (combination of) conditions, which is achieved by dividing the number of cases that display the combination Broad Call Ω Administrator Feedback and that are considered high-performing cases (n=4) by the number of cases that are high-performing (n=4), resulting in a consistency score of 1.*

considered as a well-performing case. Therefore, the claim of necessity for this particular conjunction between administrator feedback and broad call for ideas needs to be rejected. Although they together are not necessary, they are an important combination for reaching a high level of idea generation. Having both a broad call for ideas and an active administrator feedback team in place are likely interdependent design elements, and possibly complementary to reach high idea generation performance.

Drawing further on the necessity analysis from above, a second insight arises. When comparing the three identified high-performing configurations with configuration L, there is a notable difference. Put simply, the three configurations in the solution always have either a) a temporary idea sharing period, b) promotional communication at the launch, or c) rewards to attract participants. Yet, configuration L does not hold any of these. Configuration L might therefore suggest that, when none of three above design elements are present, the idea contest fails to lead to high idea generation performance - even when it includes a broad call for ideas and administrator feedback. In other words, having at least one of those idea contest design elements in place, in combination with the broad call for ideas and the administrator feedback team, is sufficient for reaching high idea generation levels. This seems to suggest that the three design elements (soliciting period, promotional communication, rewards) operate as potential substitutes. and that at least one of them should be in place in order to reach a high level of idea generation. This is in line with the conceptual framework of Dahlander et al. (2019) where it is suggested that each phase (define – broadcast – attract) is important when organizing crowdsourcing. We find suggestive evidence that at least one design element should be in place in each phase of the crowdsourcing process in order to attain a high idea generation outcome.

### 1.5.3 Why do certain idea contest designs fail to generate sufficient ideas?

Why it is certainly relevant to investigate what idea contest design configurations yielded the most ideas per employee, it is arguably even more important to understand which configurations consistently yielded the lowest amount of suggested ideas. From an idea generation perspective, if there are simply not sufficient ideas generated to begin with, then there are less ideas to choose from and the likelihood that ideas of exceptional quality will be present in the sample becomes slim (Girotra et al., 2010;

Kornish & Ulrich, 2011). Not generating sufficient ideas can in other words put the entire (front end of the) innovation process at jeopardy.

Interestingly, the results of the fs-QCA of low idea generation performance (table 8) uncover only two idea contest design configurations. Yet, they cover more cases in our dataset (solution coverage = 0.458) than the three configurations in the high-performing set of cases (table 7). This indicates that more cases in our dataset are part of the identified low idea generation configurations. The two solutions lead to some important insights and implications.

First, there are several commonalities between the two identified configurations. On the one hand, both solutions are characterized by the absence of promotional communication when broadcasting the idea contest at its launch, which might suggest that failing to promote the idea contest properly could be a primary cause for failure. A second commonality between the two identified configurations in the solution relates to the idea sharing period, where we observe that the idea sharing period does not seem to explicate the low outcome of suggested ideas. Therefore, it can be considered redundant, at least for estimating low idea generation performance. Taken together, this implies that it is likely more important to establish promotional communication when broadcasting the idea contest compared to deciding between create momentum with temporary idea soliciting periods or continuously capturing ideas.

A second insight can be derived from the low-performing cases when contrasting it with the high-performance cases. Recall that having a broad call for ideas and administrator feedback together was a most prominent conjunction present in each high performing idea contest design configuration. Interestingly, the link between these two design elements is always ‘broken’ in the low-performing configurations. The first identified path has an active administrator feedback team, but no broad call for ideas, while the second path has a broad call for ideas, but no administrator feedback team. This seems to suggest once again that there could be an important connection, and potentially complementarity, between a broad call for ideas and administrator feedback.

Thirdly, if we compare the high-performance idea contest design configurations with the low performance configurations, we can observe that there are no configurations that perfectly oppose one another. Some conjunctions (or absence of conjunctions) might be sufficient to lead high performance,

but their exact opposite does not necessarily lead to low performance (and vice-versa), which suggest that there is causal asymmetry between idea contest design and idea generation levels.

### 1.5.4 Modifications of idea contest design

While most firms in the case sample are represented by one idea contest (one case), there are three firms that organized multiple idea contests. This gives us the opportunity to examine whether any changes were made by these firms over time to the idea contest design, for what reason they were made and whether the idea contest design changes altered idea generation performance. The first firm in our case sample organized three consecutive idea contests (7A, 7B, 7C) on a yearly basis, yet without modifying their idea contest design. Interestingly, the three idea contests have a similar performance level, being positioned between the 10th and 25th percentile in terms of performance, with a slow decrease each year of suggested ideas per capita.

The second firm organized two idea contests (case 31A and 31B) in sequence. Both idea contest designs include the use of well-specified challenges and an active administrator feedback team. The first idea contest design used temporary idea soliciting periods and both pecuniary and non-pecuniary rewards to attract employees to suggest ideas, realizing a relatively high amount of suggested ideas per capita (close to the 80th percentile of best performing ideas). Satisfied with the engagement of their employees in the idea contest, the organizers decided to organize a second idea contest, this time with a continuous idea soliciting period and no emphasis on rewards, to capture ideas from their employees all year through. When the continuous version of the idea contest was launched, this led to a strong decrease of suggested ideas by the employee workforce. The company itself was characterized by a project-based organization and the employees therefore were accustomed to a project-based mode of operandi (Becker et al., 2005; Bresnen et al., 2005), which conflicted with the continuous soliciting of ideas. Many of the employees were hesitant or confused whether they could still suggest ideas. As such, the organizer decided to return to the previous idea contest design, using shorter time periods to solicit ideas from the employees

The third firm organized two idea contests (case 36A and 36B), not in sequence but simultaneously. The first idea contest (36A) was characterized by a broad call for new software ideas,

a continuously idea soliciting period and several pecuniary and non-pecuniary rewards. The second idea contest was stylized as a sort of hackathons, with well-specified challenges relating to specific software programs, time-bound idea soliciting periods of a couple of weeks, company-wide promotional communication to broadcast the launch of the challenges and (pecuniary and non-pecuniary) rewards for winning idea contributors and teams. Both idea contests had no active administrator team in place to provide feedback to ideas. Comparing the two idea contest designs, it is apparent that the first idea contest reaped less idea suggestions (the case is part of the 20th percentile of worst performing idea contests) from a small percentage of the employee workforce. The second idea contest performed seemingly better, with an idea generation performance close to the median in our case sample. While this might reflect the difference in idea contest design, it could also be explained by having two idea contests running at the same moment in time, vying for the attention of the employees. Nevertheless, it seems that the idea contest that used the temporary idea soliciting period and considerable promotional communication to broadcast its well-specified challenges, succeeded in attracting the most idea suggestions from a larger group of employees.

### 1.5.5 Examining a deviant case

While the majority of idea contests we investigated all abide to the above propositions, there is one idea contest in our sample that can be considered as a deviant case, or a 'black swan' (Flyvbjerg, 2006). Unlike the 'extreme case', which is characterized by having an extreme value for the outcome or the explanatory variables, or the 'contradictory case' which fully contradicts the uncovered findings, a 'deviant case' represents a case that diverges from the general identified cross-case relationships or expectations (Seawright & Gerring, 2008). Building on our identified fs-QCA results, we generally would expect that idea contests that a) combine a broad call for ideas with administrator feedback and b) that at least have either a temporary idea sharing period, a promotion of the launch of the contest or rewards to attract participants in place would result in high idea generation performance.

But one idea contest (case 33) effectively embodies the aforementioned idea contest design as it seemingly has all design elements in place: the broad call for ideas, the temporary idea sharing period, the promotion of the launch, the rewards to attract participation and the active administrator feedback

team. From an idea contest design perspective, it seems the organizers have considerably focused on managing each crowdsourcing phase of the idea contest. Yet, it is an idea contest that did not perform highly in terms of generating ideas. While the idea contest is also not considered low performing, it is falls more towards the less performing cases in our case data sample as it is located between the 25th and 50th percentile in terms of idea generation performance.

The identification of a deviant case luckily does not necessarily imply that the entire findings are to be refuted (Flyvberg, 2006) but actually provides us the opportunity to investigate why the case in question deviated from the generally observed patterns (Rudin, 2006; Starman, 2013; Yin, 2017). Deriving from our interviews with Yambla representatives, it turned out that the particular case, a wholesale vendor firm active in Belgium, could at that time best be described as *"a company in turmoil."* Middle management had taken the initiative to organize an idea contest with the ambition to activate the employees to suggest ideas, with a total target group of five thousand employees and an expected participation rate of at least ten percent. With that objective in mind, they had implemented many elements to attract employees to suggest ideas during a period of a couple of weeks and had put considerable effort in broadcasting the idea contest through a promotional campaign. Moreover, to not restrain idea generation, a broad call for ideas was used and the organizing team also provided feedback to each suggested idea.

Yet, at that time, the company experienced some financial challenges, which could lead to downsizing and even collective dismissal. Regardless of the situation, the idea contest was launched as originally planned, resulting in modest activity on the idea suggestion platform. A total of 371 employees registered on the idea suggestion platform, but only about 174 of those employees were effectively active on the platform. Most of the idea suggestions were suggested by mid-level managers, whereas the main bulk of the frontline employees withheld their participation.

What can be drawn from this deviant case is a fairly simple, yet fundamental insight that relates to the 'sufficient' versus 'necessary' nature of the relationship between idea contest design and idea generation performance: a well-designed idea contest is *sufficient* for resulting in high idea generation performance, but it does not necessitate it. The deviant case essentially explicates that a lack of employee engagement – here due to a circumstantial context of financial challenges, turmoil and

possible downsizing – could cause a breakdown of an idea contest, even if the right set-up and design of an idea contest is present (Nicolajsen et al., 2019; Dahlander et al., 2019; 2020).

### 1.5.6 Not enough idea suggestions or not enough idea contributors?

The deviant case above is characterized by having only a fraction of the employees suggesting ideas. This raises the question whether the lack of idea suggestions (low idea generation performance) can be explained by an wider unwillingness or inactivity of employees to suggest ideas, or by having only a mere fraction of employees suggesting ideas, while the rest of the organization remains passive observers (Nicolajsen et al., 2019).

To check for this, an indicator is added to the truth table at the right-hand side in table 11, indicating whether the idea contest configurations have an idea contributor ratio smaller than 25 percent of the employees that logged onto the idea contest platform.

Interestingly, we observe that three configurations, each represented by one case (case 29, 33, 35), are characterized by a small fraction of employees suggesting ideas. Case 29 and 35 both even have a very small fraction (lower than ten percent) of employees suggesting ideas. Each case is represented by one of the previously uncovered paths presented in the low-performing configurations. As both cases were already part of our low-performing configurations, this demonstrates that having only a few employees actively suggesting ideas corresponds with low idea generation performance. While this provide suggestive evidence why those idea contests resulted in low amount of idea suggestions, there are still other cases (configurations E & G) in our sample that failed to solicit many ideas, even though there was a balanced contribution from the employee workforce in terms of suggesting ideas.

Table 11: Supplementary truth table - with indicator that ideas are suggested by a fraction of employees (less than 25 percent)

| Config. | Broad call | Temporary idea soliciting period | Promotional communication | Rewards | Admin feedback | Consistency (low perform) | Low performance | Small fraction of idea generators (less than 0.10) | CaseID |
|---|---|---|---|---|---|---|---|---|---|
| Config. A | 0 | 0 | 1 | 0 | 0 | 0.208 | 1 | 0 | 11 |
| Config. B | 0 | 1 | 0 | 1 | 0 | 0.436 | 0 | 0 | 37 |
| Config. C | 0 | 1 | 1 | 1 | 0 | 0.275 | 0 | 0 | 15, 36B |
| Config. D | 1 | 0 | 0 | 0 | 0 | 0.250 | 0 | 0 | 1, 5, 6, 8 |
| Config. E | 1 | 0 | 0 | 1 | 0 | 0.965 | 1 | 0 | 12, 36A |
| Config. F | 1 | 1 | 0 | 1 | 0 | 1.000 | 1 | 1 | 29 |
| Config. G | 0 | 0 | 0 | 0 | 1 | 0.8286 | 1 | 0 | 4, 16, 20, 25, 32, 31B |
| Config. H | 0 | 0 | 0 | 1 | 1 | 0.652 | 0 | 0 | 24, 26, 30, 22 |
| Config. I | 0 | 1 | 0 | 0 | 1 | 0.954 | 1 | 1 | 35 |
| Config. J | 0 | 1 | 0 | 1 | 1 | 0.743 | 0 | 0 | 31A, 7A, 7B, 7C |
| Config. K | 1 | 0 | 1 | 1 | 1 | 0.372 | 0 | 0 | 21 |
| Config. L | 1 | 0 | 0 | 0 | 1 | 0.331 | 0 | 0 | 2, 3, 13, 28 |
| Config. M | 1 | 0 | 0 | 1 | 1 | 0.120 | 0 | 0 | 10, 23 |
| Config. N | 1 | 0 | 1 | 0 | 1 | 0.000 | 0 | 0 | 17 |
| Config. O | 1 | 0 | 1 | 1 | 1 | 0.000 | 0 | 0 | 27 |
| Config. P | 1 | 1 | 0 | 0 | 1 | 0.000 | 0 | 0 | 14 |
| Config. Q | 1 | 1 | 1 | 1 | 1 | 0.7348 | 0 | 0 | 33 |

*Red coloured letters for low performing cases, grey shade for low idea generator/employee ratio cases.* *Consistency threshold = 0.80, frequency threshold = 1*

# 1.6 Chapter Discussion

Over the past two decades, firms have increasingly turned to organizing idea contests in order to harness the innovation power of their employee workforce (Terwiesch & Ulrich, 2009; Morgan & Wang, 2010; Adamczyk, et al., 2012; Nicolajsen et al., 2019). Up to this point, organizers have been trying out various idea contests designs compositions on a trial-and-error basis, as few to no empirical research has shed light on how various idea contest design elements are best combined together. This study addresses this gap by exploratively mapping a variety of idea contests organized between 2014 and 2020 and testing out what idea contests designs succeeded or failed at generating sufficient ideas during the idea generation phase of the innovation process. In particular, we investigate a number of key design elements in the first three phases of the crowdsourcing process (define – broadcast – attract) as suggested by Dahlander et al. (2019), including the formulation of the challenge, the idea soliciting period, the promotional communication at the launch of the contest, and the rewards and feedback used to attract participation.

From the systematic and comparative exploration of the cases, we find suggestive evidence that high performing idea contest are those that combine multiple design elements together. Moreover, the findings seem to provide preliminary evidence for the suggestion of Dahlander et al. (2019) that each phase of the first three stages of the crowdsourcing process should be carefully managed. In particular, we find a clear trend that relates to the combination of a broad call for ideas and administrator feedback, as that combination is present in each high performing idea contest design. While this finding is not exactly mirrored in the configurational analyses of idea contests design configurations that produced a low idea generation outcome, we do observe that the low performing configurations always have either the broad call for ideas or the administrator feedback element missing. Next to the combination of a broad call for ideas and administrator feedback, the findings suggest that the idea soliciting period, the promotional communication and the provision of rewards can operate as substitutes, but at least one of those needs to present to result in a high idea generation outcome. Furthermore, low-performing idea contest configurations are shown to consist of idea contest designs where there consistently is a lack of

promotional communication, therefore arguably making this design element critical when broadcasting the idea contest.

In sum, while most of the prior literature has mainly described certain design elements in isolation, or illuminated the unifinal relationship of a singular design element with the outcome of the idea contest, we applied a configurational analysis to uncover the interplay of design elements of idea contests and exploratively link their union (or disunion) to success in idea generation or to its breakdown, e.g. too few ideas generated (Terwiesch & Ulrich, 2009; Nicolajsen et al., 2019).

Our paper contributes novel insights to the extant literature on idea contests. First, we contribute to the literature on idea contests by building a bridge between variable and case-oriented research approaches as we qualitatively map the design configurations of idea contests (cases) and link these to quantitative idea generation output, being the amount of ideas suggested by employees. Secondly, we venture into an unprecedented research setting as we study a multitude of idea contests with significant variation in their set-up or design, yet all relying on a similar instrument for collecting ideas, the idea contest. Empirical studies on the level of the idea contest have been severely limited due to the small-n problem (Goldthorpe, 1997), as it is difficult to gain access to idea contest design information over many firms. Notwithstanding the investigation of a single case, there is still need for research that compares idea contests, and how they are designed, and their performance. We hope that our overview and exploration of multiple variations of idea contest design adds fresh insights to this field of literature and can serve as a guideline for future studies investigating idea contests.

An important limitation of this study relates to relatively nascency of the used methodology. While the QCA methodology has been around for more than 30 years (Ragin, 1992; 2009; 2014; Marx et al., 2014), it is a relatively new methodology to the field of management science that is still under development. While the methodology has been argued to be useful for claiming causal inferences, it is applied in this study to exploratively uncover suggestive evidence about idea contest design and idea generation performance. The uncovered idea contest design configurations presented here should at best be interpreted as suggestive descriptive inferences derived from the cases, not as causal relationships (King, et al., 1994; Eisenhardt & Graebner, 2007; Yin, 2017).

Nonetheless, we hope that the chosen methodology provided an alternative perspective to the innovation literature field focussing on idea contests by investigating cases from the principle of causal complexity (Ragin, 2009; Schneider & Wagemann, 2010). We show that different design elements of idea contests are consistently linked to high (low) levels of idea suggestions when they are combined (conjunction), we identify multiple alternative paths that lead to high (low) idea generation levels (equifinality) and we show that not all the opposites of certain design configuration that lead to high performance will necessarily lead to low performance if they are turned around (asymmetry). We hope that the uncovered findings might inspire future studies to investigate the intersection between design elements of idea contests and front end activities.

# Chapter 2

# The Role of Feedback on the Development of Ideas during Idea Contests

[3]

## 2.1 Introduction

To stay ahead in today's competitive business environment, firms seek to create a constant inflow of high-quality ideas to fuel their innovation process (Van der Ven, 1986; Drejer & et al., 2004; Kijkuit & Van den Ende, 2007; Björk & Magnusson, 2009). In order to do so, firms rely strongly on their employees to generate and turn ideas into innovations. Highly innovative ideas do not arise out of nowhere within firms. They generally are the result of a complex social process where innovators generate, react to, and modify ideas (Van de Ven, 1986; Beretta et al., 2017; Perry-Smith & Mannucci, 2017). Especially thanks to the widespread adoption of digital platforms nowadays, employees have become enabled to voice and promote their ideas to colleagues in order to gather feedback (Kijkuit &

[3] This chapter is based on joint work with prof. dr. Bart Leten (KU Leuven and Hasselt University) and prof. dr. Walter Van Dyck (Vlerick Business School and KU Leuven). Earlier version of the chapter were presented at DRUID Academy 2017, R&D Management Conference 2017, RENT Conference 2017 and at the Annual Strategic Management Society Conference 2018, where it was nominated for best paper and best PhD paper.

Van den Ende, 2007; Björk & Magnusson, 2009; Marion et al., 2014; Spagnoletti et al., 2015; Beretta, 2018). While before the front end of the innovation process was considered as fuzzy or chaotic and its underlying activities were poorly understood (Crawford, 1994), the innovation literature has increasingly outlined which activities materialize during the creative process of generating, improving and selecting ideas (Kijkuit & Van den Ende, 2007; Björk & Magnusson, 2009; Beretta, 2018). With the widespread use of idea capture platforms (Cooper & Edgett, 2008), firms have turned extensively to congregating employees in idea contests with the intention of soliciting idea suggestions and filtering the most promising ones (Terwiesch & Ulrich, 2009; Morgan & Wang, 2010; Hutter et al., 2017; Porter et al., 2020). Surrounding the prominence of internal idea capture platforms, a growing body of literature is manifesting itself. Question raised include how firms can manage employees as idea generators (Ericson, 2012), how employees can be incentivized to generate and contribute to ideas (Malhotra & Majchrzak, 2014; Hoornaert et al., 2017), what tasks a moderator should carry out (Beretta et al., 2017), and how the social dynamics of the firm affect the generation and take-off of ideas (Bakker et al., 2007; Neyer et al., 2009; Spagnoletti et al., 2015; Beretta, 2018).

Most recently, the role of feedback during the front end of the innovation process has attracted interest from innovation scholars (Wooten & Ulrich, 2017; Beretta, 2018; Zhu et al., 2018; Piezunka & Dahlander, 2019). Wooten & Ulrich (2017) empirically showed that feedback by managers about the quality of employees' ideas increases repeated participation and heightens the quality of new idea submissions. Beretta (2018) and Zhu et al. (2018) recently demonstrated that employee feedback can be used to inform managers on the content and potential of ideas, reducing the uncertainty when having to evaluate and discern ideas. Ideas that receive more negative-tainted feedback are found to be less likely selected for investment (Beretta, 2018), and ideas that receive more constructive feedback from a variety of feedback sources are found to get higher manager evaluations (Zhu et al. 2018).

While prior research demonstrated how feedback stimulates idea generation and can be used to support idea selection, little is known how feedback influences the idea development process whereby ideas are iteratively improved to become better ideas. According to Porter et al. (2020) feedback is an important means of enriching ideas. Building on feedback theory (Payne & Hauty, 1955; Ashford, 1986; Nadler, 1979; Oldham & Cummings, 1996; Zhou, 2008; Ashford & De Stobbeleir, 2016), we argue that

the impact of feedback on idea development depends on the nature of feedback and the characteristics of feedback providers and receivers. As for the nature of feedback, we distinguish between feedback that contains developmental information (directive feedback) and feedback that encourages (motivational feedback). We also examine the role of feedback similarity, which indicates to which extent feedback addresses similar issues. As for the characteristics of feedback providers and receivers, we examine how the relationship between feedback and idea development is moderated by the hierarchical ranks of the persons involved.

Empirically, we examine how feedback influences the development of ideas during three idea contests organized by a global management consulting firm between 2014-2016. An idea contest is a competitive ideation process where employees generate and ameliorate ideas to corporate innovation challenges over multiple rounds (Terwiesch & Xu, 2008; Girotra et al., 2009; Terwiesch & Ulrich, 2009; Leimeister & Bretschneider, 2009; Morgan & Wang, 2010). During the three idea contests 395 ideas passed through five development stages and evaluation gates where they were assessed on their quality and were either eliminated or allowed to proceed for further development. We find that directive feedback has a positive effect on the stepwise development of ideas. This effect is greater if different people provide similar directive feedback. No overall positive effect on the development of ideas is found for motivational feedback, except for feedback recipients who occupy low hierarchical positions in their organization. While we find that the effect of feedback is moderated by the hierarchical rank of the feedback recipients, we do not find evidence of differential effects of feedback in function of the hierarchical rank of feedback providers.

The structure of the paper proceeds as follows. In the next section, we discuss the background literature on the idea development process and the role of feedback. Thereafter, we rely on feedback theory to formulate our research hypotheses. In the third section we discuss the data, the variables and the methodology employed. In the fourth section we present the empirical results. The final section summarizes and discusses our findings.

# 2.2. Literature Overview

## 2.2.1 Development of Ideas in the Front End of the Innovation Process

The front end of the innovation process, alternatively labelled as the ideation or creativity phase, is defined as the period between the discovery of an innovation opportunity and the selection for development of an idea that addresses this opportunity (Cooper & Kleinschmidt, 1986; Khurana & Rosenthal, 1997, Kim & Wilemon, 2002, Van den Ende et al., 2015). During the innovation front end opportunities are identified, ideas are generated and iteratively improved, and eventually the most attractive ideas are selected to develop into innovative products, services or processes (Cooper & Kleinschmidt, 1993; Reinertsen, 1999; Smith & Reinertsen, 1991; Kijkuit & Van den Ende, 2007; Cooper & Edgett, 2008).

Academic studies on the innovation front end have focused particularly on the generation or the selection of ideas. Firstly, substantive attention has been directed at the generation of ideas, often through setting up experimental studies on brainstorming (Diehl & Stroebe, 1987; Mullen et al., 1991; Rietschzel et al., 2006; Girotra et al., 2011; Kornish & Ulrich, 2011; Mack & Landau, 2018). A second point of scholarly interest in the innovation front end literature concerns the selection of ideas. Innovation scholars have investigated how ideas are evaluated by decision makers (Hart et al., 2003; Dean et al., 2006; Martinsuo & Poskela, 2011; Kruft et al., 2019) and studied who oversees the evaluation and selection of ideas in firms (Criscuolo et al., 2017; Hoornaert et al., 2017) and how accurate and predictive their evaluations are (Reitzig & Sorenson, 2013; Kock et al., 2015, Salter et al., 2015).

But despite the emerging body of literature on the innovation front end, there appears to be a resting consensus that firms often do not succeed at yielding ideas of sufficient maturity and high quality (Björk & Magnusson, 2007; Van den Ende et al., 2015; Wooten & Ulrich, 2017). Recently, innovation scholars have highlighted that this is because a cardinal activity of the innovation front end is underemphasized, namely the process of developing and refining ideas (West, 2002; Griffith-Hemans & Grover, 2006; Elmquist & Segrestin, 2007; Kijkuit & Van den Ende, 2007; Floren & Frishammar, 2012; Bergendahl & Magnusson, 2015; Perry-Smith & Manucci, 2017). They argue that in-between the

recognition of an innovation opportunity and the final decision to develop an idea into a marketable product or service, a stepwise development process should take place wherein initial ideas are reviewed and ameliorated, typically iteratively, into more mature and higher quality ideas.

Griffiths-Hemans & Grover (2006) label the innovation front end as an idea fruition process, consisting of three steps: idea creation, idea concretization and idea commitment. Elmquist & Segrestin (2007) highlight the crucial importance of experimenting with the early development of ideas for innovation success in drug development. Floren & Frishammar (2012) show that the innovation front end comprises more than the mere generation of ideas, showing that after an opportunity is identified, it should undergo development, alignment and legitimization before it is sufficiently concretized to be implemented. Similarly, Markham (2013) shows how the front end activity of ameliorating and refining ideas is crucial to attain a high pay-off when commercializing the innovations. Finally, Perry-Smith & Manucci (2015) structurally distinguished several phases in the innovation front end, calling out 'the elaboration phase' as one of four central phases in an idea journey.

During the stepwise development process of ideas, innovators interact with others to acquire valuable information and the knowledge necessary to conceptually expand and refine their ideas (Bergendahl & Magnusson, 2015). Social interactions have long been established by the management literature to be a central and ameliorative part of the innovative process of firms (Allen, 1977; Tushman & Nadler, 1978; Van der Ven, 1986; Nonaka, 1994; MacCrimmon & Wagner, 1994). Through interacting with others, new information gained can be used by innovators to affirm or denounce key cornerstones of ideas. Within organizations, information sharing during the front end typically occurs in two ways. Either employees form teams to jointly develop ideas, or employees collect feedback on their ideas (Griffith-Hemans & Grover, 2006; Erickson et al., 2012, Beretta, 2018; Zhu et al., 2018).

The number of social interactions on ideas have greatly expanded through the introduction of digital idea management platforms (Kijkuit & Van den Ende, 2007; Marion et al., 2014; Spagnoletti et al., 2015; Beretta, 2018; Füller et al., 2014). Digital platforms can be used to share ideas and to collect feedback. While some organizations reserve these platforms for their own employees, others open them up to external crowds, such as customers, eco-system partners and communities (Poetz & Schreier, 2012; Porter et al., 2020). Recent studies have analysed the operation of these digital platforms and the

roles that users take up (Füller et al., 2014; Malhotra & Majchrzak, 2014; Hoornaert et al., 2017; Beretta, 2018). Central insights are that users of digital platforms take up different roles, where some users specialize in idea generation and others focus on providing feedback (Füller et al., 2014; Malhotra & Majchrzak, 2014) and that these different forms of participating on the platform generate divergent effects on the number of ideas (Wooten & Ulrich, 2014; Piezunka & Dahlander, 2019) and the participant's sense of being part of the virtual community (Hutter et al., 2017).

### 2.2.2 Feedback in the Front End of the Innovation Process

In recent years, scholarly attention has been directed at investigating the use of feedback in the front end of the innovation process. Main findings link feedback with more (and possibly better) idea suggestions from idea contributors (Wooten & Ulrich, 2017; Piezunka & Dahlander, 2019) and present feedback as an important tool for idea evaluation and selection (Beretta, 2018; Zhu et al., 2018). Wooten & Ulrich (2017) demonstrated that idea contributors who receive feedback on their ideas are more likely to suggest additional ideas. Piezunka & Dahlander (2019) show that the willingness of idea contributors to suggest ideas is higher if the organization provides feedback when rejecting an idea. Beretta (2018) shifts the attention to idea selection, demonstrating that feedback commented on an idea is used as tool for selection decisions, lowering the likelihood for ideas to be selected if they receive negatively framed feedback. Building on this notion, Zhu et al. (2018) linked feedback to idea evaluation, showcasing that evaluation panels give a higher score to ideas that received feedback from various actors with diverse cognitive and demographic characteristics.

Together, these studies have unambiguously shown that feedback plays an important role in the idea generation and selection phases of the front end of the innovation process. However, little is known on how ideas develop over time in response to feedback. According to Porter et al. (2020) feedback plays an important role in idea development. We therefore investigate the role of feedback in the stepwise development of ideas - from initial concepts into fully corroborated ideas - during three digital idea contests comprised of multiple development phases in the innovation front end of a major European firm.

# 2.3 Conceptual framework and hypotheses

## 2.3.1 The feedback process

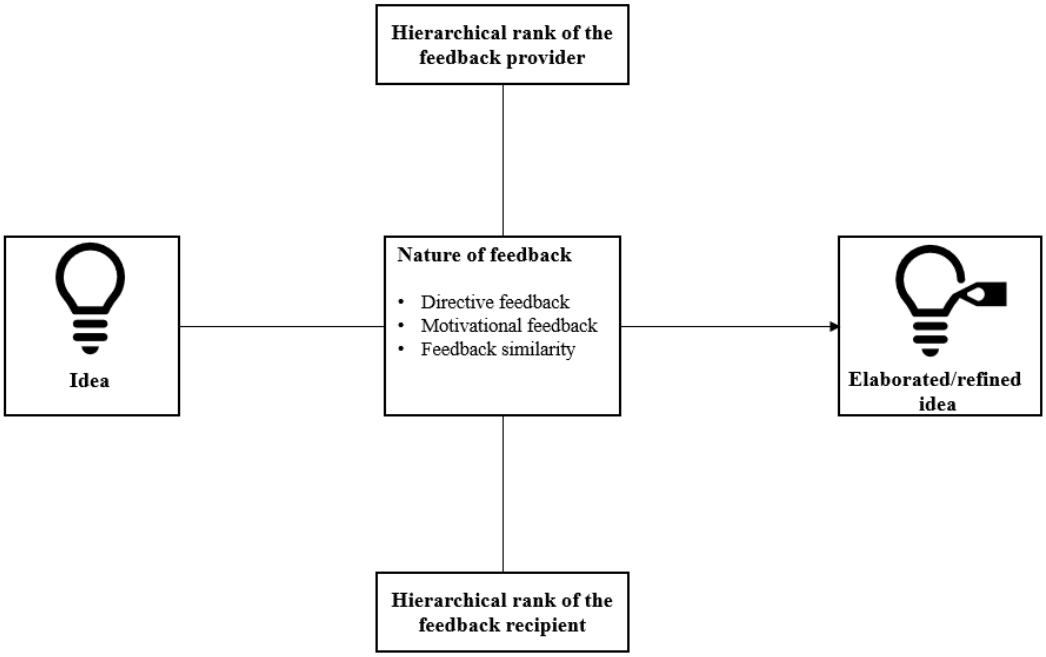
Feedback is a well-known, long-established and multi-faceted instrument for communicating evaluative information on performance and for bringing about change (Nadler, 1979). In the field of organizational behaviour, scholars have undertaken considerable efforts to build theory on how feedback affects employee behaviour (Payne & Hauty, 1955; Ashford, 1986; Nadler, 1979; Oldham & Cummings, 1996; Zhou, 2008; Ashford & De Stobbeleir, 2016). Organizational scholars have advanced several central parameters that shape the relationship between feedback and employee behaviour. Central parameters include the nature of feedback, the characteristics of the feedback provider, and the characteristics of the feedback receiver (Ilgen et al., 1979; Dodd & Ganster, 1996; Oldham & Cummings, 1996; Zhou, 1998; Shalley & Perry-Smith, 2001; Zhou & Shalley, 2003; Zhou, 2008).

The nature of the feedback given is advocated to affect how employees will react to feedback (Ilgen et al., 1979; Balzer et al., 1989; Dodd & Ganster, 1996; Zhou, 2008). The nature of feedback can differ on its valence, e.g. whether it is framed in a positive or negative way (Zhou, 1998; Beretta, 2018), the style in which feedback is delivered, e.g. informal or controlling (Zhou, 1998; Shalley & Perry-Smith, 2001), and the developmental content of the feedback (Nadler, 1977; Payne & Hauty, 1995; Zhou, 2003; 2008). Developmental content of feedback relates to information that the recipient can reflect upon, leverage and learn from (Nadler, 1977; Ashford & Cummings, 1983; Payne & Hauty, 1995; Zhou, 2003; 2008). Feedback containing developmental content is defined in the feedback literature as directive feedback as it provides the recipient the opportunity to internalize the information transmitted and adjust on his/her work (Nadler, 1977; Payne & Hauty, 1995; Zhou, 2003; 2008). Feedback without developmental content is suggested to purely serve as a positive reinforcement of the feedback recipient. This form of feedback is labelled as motivational feedback (Nadler, 1977; Amabile, 1996; Fodor & Carver, 2000; Zhou, 2008).

Organizational scholars suggest that the extent to which employees will react to feedback depends also on the characteristics of feedback providers and recipients (Ashford et al., 2003; Fodor & Carver, 2000; Locke et al., 1968; Zhou, 2008). Employees differ in function of their hierarchical ranks,

competences and knowledge domains they hold (Kijkuit & Van den Ende, 2010; Beretta, 2018). A hierarchical rank is considered as a formal representation of the power and status an actor holds within an organizational structure (Emerson, 1962; Tushman & Romanelli, 1983; Ibarra, 1993). The hierarchical structure of the firm represents the asymmetrical distribution of resources, responsibilities and decision making authority, where lower echelons have less formal power and status, and higher echelons hold a larger share of formal power and status (Mintzberg, 1983; Hambrick, 1981; Ibarra, 1993).

Figure 2: Conceptual model of feedback and idea development




We build on insights of the feedback theory to develop hypotheses on how ideas develop over time in function of the feedback they receive. Figure 2 presents our conceptual model. We argue that the relationship between feedback and idea development is influenced by the nature of feedback and characteristics of feedback providers and recipients. As for the nature of feedback, we distinguish between directive and motivational feedback, and examine the role of feedback similarity. Feedback similarity indicates to what extent feedback of different people is coherent and addresses similar issues. As for the characteristics of feedback providers and receivers, we examine how the relationship between feedback and idea development is moderated by the hierarchical ranks of the persons involved.

### 2.3.2 Nature of Feedback: Directive and Motivational Feedback

Directive and motivational feedback are expected to affect the development of ideas in a different way (Nadler, 1977; Zhou, 2008; Ederer, 2010). Directive feedback directs idea holders by clarifying the required standards of output and by transferring developmental information that can used to make improvements on their ideas (Ashford, 1986; Payne & Hauty, 1995; Zhou, 2008). When receiving directive feedback, an idea holder can reflect upon and internalize the information transmitted to him or her, use it to amend the idea and to reduce commitment to low quality strategies (Nadler, 1977; Einhorn & Hogarth, 1981; Matsui et al., 1987; Balzer et al., 1989; Dodd & Ganster, 1996; Ederer, 2010). Directive feedback therefore is intended to steer the work of an idea holder and to stimulate learning (Payne & Hauty, 1995; Zhou, 2008). In that light, directive feedback can be used to make improvements on the ideas that an idea holder is working on (Ashford, 1986; Payne & Hauty, 1995; Zhou, 2008). Receiving directive feedback is expected to trigger idea holders to develop and refine their ideas in response to directive feedback. This leads to the following hypothesis:

*Hypothesis 1: Directive feedback has a positive effect on the development of ideas.*

Motivational feedback does not provide idea holders with developmental information, nor does it enable them to acquire new knowledge that can be leveraged to improve their ideas (Nadler, 1977; Payne & Hauty, 1995; Zhou, 2003; 2008). Motivational feedback is purely communicated with the aim of motivating idea holders, most typically by cheering them on (Nadler, 1977; Amabile, 1996; Fodor & Carver, 2000; Zhou, 2008). Receiving motivational feedback is suggested to create energy to exert more effort as it sends a positive signal to idea holders that they have a valuable idea or by simply cheering them on, which in turn is argued to result in heightened self-confidence and willingness to search for alternative solutions to problems (Locke et al., 1968; Nadler, 1977, McCarty, 1986; Zhou, 2008; Ederer, 2010; Mack & Landau, 2018). Organizational actors with higher levels of motivation tend to be more cognitively flexible, seek higher levels of challenge and tend to search for more alternative solutions to solve hurdles that they encounter (Deci & Ryan, 1985; Zhou, 2008). Taking together these arguments point out that idea holders who receive motivational feedback will be stimulated to exert more effort,

which is expected to benefit the development and refinement of their ideas. As such, we expect the following:

*Hypothesis 2: Motivational feedback has a positive effect on the development of ideas.*

### 2.3.3 Nature of Feedback: Feedback Similarity

The stepwise development of ideas takes place in the front end of the innovation process (Floren & Frishammar, 2012; Griffiths-Hemans & Grover, 2006) which is characterized by a lot of uncertainty. This uncertainty relates to both the quality of ideas under development and the relevance of the feedback provided. Ideas can receive directive feedback from a variety of people over time (Beretta, 2018). The feedback obtained may differ in content and highlight different areas for improvement or may partially overlap and contain similar advice on how to further develop an idea. We expect that idea holders will consider directive feedback more relevant if different people provide similar feedback on how to improve ideas. After all, if different people give similar feedback, there is a good chance that this is relevant feedback, which can best be followed up by idea holders. Studying the impact of feedback on employee creativity, Zhou (2008) followed a similar reasoning and argued that persistency in feedback is important for employees to learn from feedback. We therefore expect:

*Hypothesis 3: Feedback similarity has a positive effect on the development of ideas.*

### 2.3.4 Hierarchical Rank of the Feedback Provider

Besides the nature of feedback, it is important to take in consideration who is providing feedback, as this can affect what the recipient will do with the feedback (Ashford et al., 2003; Zhou, 2008). As outlined in the feedback literature (Ashford & Tsui, 1991; De Stobbeleir et al., 2011; Ashford & De Stobbeleir, 2016), employees tend to seek feedback from those with high hierarchical positions, as they hold more power in the organization or have a higher perceived level of status (Morran et al., 1985; Ashford & Tsui, 1991; Vancouver & Morrison, 1995). Logically, receiving feedback from direct supervisors on job performance has become an ingrained activity within many firms (Ashford & Tsui, 1991; De Stobbeleir et al., 2011). In the idea development process, idea holders can receive feedback from other sources too, unrestricted by organizational hierarchies, such as from immediate co-workers,

peers in other units, and subordinates (Mack & Landau, 2018). Feedback can therefore be received from a variety of organizational actors with differential hierarchical ranks.

We argue that an idea holder will more likely consider feedback if the source of feedback has a high hierarchical rank. We base this expectation on two arguments. First, when receiving feedback from high ranking organizational members, idea holders could perceive the feedback as more valuable (Zhou, 2008; Van der Vegt, 2010; Campbell et al., 2012). Employees with a higher hierarchical rank in an organisation have typically accrued more knowledge and expertise over the years, overcome more hurdles to reach the high hierarchical position and often have been present longer in the organization, therefore having a better understanding of the firm's values and strategy (Van der Vegt, 2010; Campbell et al., 2012; Ashforth & Schinoff, 2016; Fuchs et al., 2019). The feedback provider of a high-hierarchical rank might therefore be perceived as a more experienced, knowledgeable and trustworthy source (Reitzig & Maciejovsky, 2015; Keum & See, 2017) which likely creates the perception that the feedback transmitted is more valuable (Zhou, 2008).

Second, due to the principal-agent relationship, idea holders could feel obliged to consider feedback from feedback providers with a high hierarchical rank because the latter have considerable power and status in the organization (Ilgen, 1979; Ibarra, 1993; Gibbons, 2005). Idea holders could therefore feel obliged to exert additional effort when receiving motivational feedback from a person with a high hierarchical rank or take the information transmitted to them in directive feedback on board in the development and further elaboration of their idea. Therefore, we posit the following hypothesis:

> *Hypothesis 4: Directive and motivational feedback from feedback providers with a high hierarchical rank have a larger positive effect on the development of ideas than the same feedback from feedback providers with a low hierarchical rank.*

### 2.3.5 Hierarchical Rank of the Feedback Recipient

As theorized in extant feedback literature, the individual-level characteristics of a feedback recipient, in our case an idea holder, will likely affect the extent in which feedback is reacted on and internalized (Locke et al., 1968; Zhou, 2008; Fodor & Carver, 2000). We expect that idea holders with low hierarchical positions are more likely to develop their ideas in response to feedback than their

counterparts in high hierarchical positions. Idea holders in high hierarchical positions have power and status in their organization (Keum & See, 2017) and therefore may be less likely to consider feedback (Harvey & Fischer, 1997; See et al., 2011). High-hierarchy members have been shown to be less concerned with the beliefs, opinions and feedback both from colleagues positioned lower in the organizational hierarchy, as they are less dependent on them, and from their peers as they do not want to acknowledge their dependence on others in fear of undermining their perceptions of power or status (Kipnis, 1972; Fiske, 1993; de Jong et al., 2007). Idea holders who hold low hierarchical positions are expected to react more to feedback in order to gain the favour of feedback providers (Fiske, 1993; Anderson & Berdahl, 2002; Keltner et al., 2003), which may help them in advancing their careers. We hypothesize:

> *Hypothesis 5: Directive and motivational feedback have a larger positive effect on the development of ideas when received by feedback recipients with a low hierarchical rank rather than by feedback recipients with a high hierarchical rank*

# 2.4 Data & Methodology

## 2.4.1 Context and Data Sources

We test our hypotheses on a unique dataset, retrieved from Apollo Belux, a pseudonym for a leading global management consulting firm that provides strategy, digital, technology, and operations consultancy services. We collected data from the Apollo Innovation Challenges, a series of three annually internally-organised idea contests which took place between 2014-2016 in Belgium and Luxembourg. An idea contest is a competitive ideation process wherein employees generate and improve ideas over multiple rounds (Terwiesch & Xu, 2008; Terwiesch & Ulrich, 2009). At the end of each phase, ideas are evaluated and filtered, so that only ideas of the highest quality survive by the end of the idea contest and get selected for further implementation and commercialization. The objective of the idea contests was to generate ideas that could digitally innovate or disrupt society. The management of Apollo Belux organised these idea contests with the intent to structure the innovation front end and to stimulate employees in the generation and development of innovative ideas.

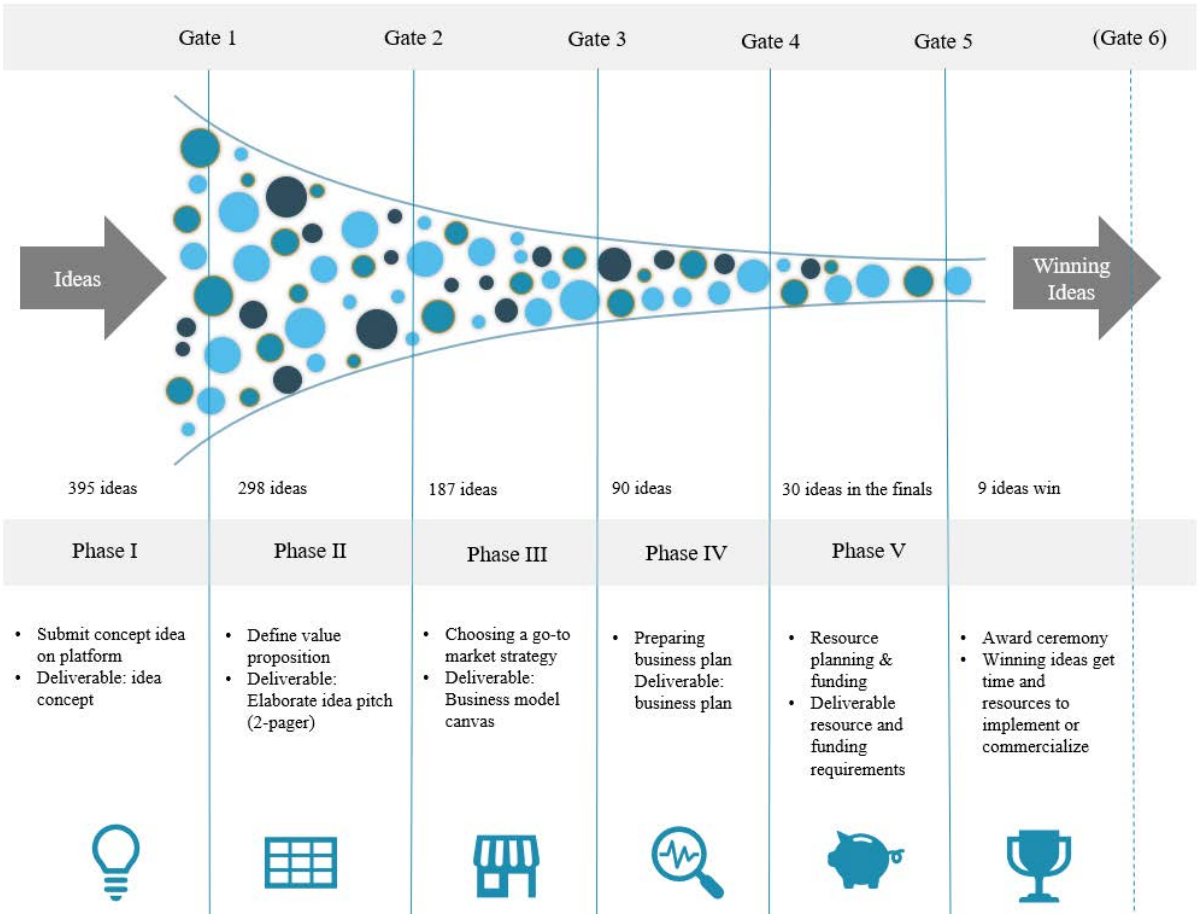
Every year, the management of Apollo Belux formulated a number of challenges that outlined the scope for ideas to digitally innovate or disrupt the society, such as improving smart mobility, digitally reinventing the government or leveraging big data in new domains. While most challenges were formulated by the management of Apollo Belux a small number of challenges were specified by key clients of the firm. Apollo Belux also included one open call for ideas in each idea contest, in order to not having to forfeit valuable ideas that did not fit clearly with one of the specified challenges. All employees of the firm were invited freely to participate to the idea contests. The workforce of Apollo Belux counted 966 employees (anno 2016). Participation could be done individually or in team. Employees who did not come up with an idea could also join as team members of idea holders at the start of the idea contest. Furthermore, all employees were invited to provide feedback on ideas on the Yambla idea management software platform that was installed in support of the idea contest.

On the idea management platform, Apollo Belux's management broadcasted the challenges and the open call for ideas. Employees could then login to their personal profile, post ideas in response to the challenges or the open call for ideas, view ideas of others and provide feedback to each other's ideas. The platform tracks the progress of each idea as it proceeds throughout the funnel process of the idea contest and keeps records of all the online activity and interaction happening between the participating employees. The platform was also made available to employees via a mobile app, so that employees could get access to the platform also if they were not in their offices or had no access to a computer.

At the end of each idea contest, three winning ideas are selected by a jury of internal managers and external experts. The selected winners receive support and resources to further implement and eventually commercialize their idea. Employees proceeding until the final round of an idea contest, have to present their ideas before the senior board of directors. The combination of guaranteed resource commitment, social recognition and visibility for the board of directors served as the main incentives for employees to participate in the idea contests. Approximately 55% of the workforce (n= 427) participated by either submitting their own idea, participating in another idea or by providing feedback on the platform.

The Apollo Belux Innovation Challenges followed a predetermined structured development and selection process (see figure 5). A total of 395 ideas entered the idea contests. After their genesis, these preliminary ideas become concretized and refined by the idea holders into fully elaborated ideas by undergoing several development phases. Each idea contest follows the same order of development tasks: entering the initial concept of the idea (stage 1), defining a value proposition and a business model canvas (stage 2), choosing a go-to-market strategy (stage 3), preparing a business plan (stage 4), and eventually specifying resource and funding requirements (stage 5). The output at the end of the contests are full-fledged elaborated ideas. After each development stage there is an evaluation gate where ideas are assessed by internal and external experts on their quality and are either eliminated or allowed to proceed and develop further.

Figure 3: The Idea contest process at the Accenture Belux 'Innovation Challenges'



The idea contests are time-bound and take place over a predetermined period of five months. Over the duration of the three contests, 395 ideas were submitted (stage 1), 297 ideas reached to stage two, 186 ideas to stage three, 87 ideas to stage four, 27 ideas to stage five (the finals) and 9 ideas were chosen as winners.

To construct the key variables of our study, we gathered and combined data from two data sources. The first data source is the Yambla idea management software platform, where data on the ideas are stored, as well as the online activity of the employees, including the giving of feedback. The second data source is the Apollo Belux's human resource database. This database holds background information on employees of Apollo Belux, including information on the age, gender, hierarchical rank and departments in Apollo Belux.

### 2.4.1.1 Measures – Dependent Variable

As we are interested in the effect of feedback on the stepwise development of ideas, we use the time that an idea survives in an idea contest as dependent variable. Ideas develop iteratively through five stages where at the end of each stage they are evaluated at a gate. At each gate, all ideas are assessed and compared by a jury of innovation experts on their quality and consequentially are either eliminated or allowed to develop further and proceed to the next phase. A pre-determined number of ideas is allowed to proceed to each consecutive phase. The jury evaluating ideas is comprised of firm representatives with innovation expertise, representing various departments and hierarchical ranks, and external innovation experts who join the juries to limit any possible internal politics and selection biases (Reitzig, 2001). The evaluation and selection of ideas are done through consensual agreement in line with the standards as proposed by the creativity literature (Amabile, 1996; Amabile & Hennessey, 2011). The innovation jury are blinded from the feedback that is given to ideas on the digital idea platform when evaluating ideas.

### 2.4.1.2 Measures – Feedback Variables

Feedback is communicated through commenting on each other's ideas on the idea management platform. All employees could access the digital platform to view the submitted ideas and provide feedback. In total, 848 feedback commentaries were provided to the 395 ideas. Each feedback message - in the format of a text - was classified following an interpretative content coding approach as either

*directive feedback, motivational feedback or rejection feedback*. Comments that were not considered feedback are omitted from the analyses. The feedback commentaries were read, interpreted and categorized by i) the lead researcher and ii) eight students with a master in innovation and entrepreneurship to check for interrater agreement and consistency. Directive feedback is defined as feedback that contains developmental information on how to further improve an idea. Motivational feedback does not contain developmental information and takes the form of praising or simple cheering. The feedback categorizations show strong intra-class agreement, as the categorizations show a 97.6 percent agreement. To control for chance agreement, we also compute the Cohen's Kappa and Gwet's AC1, which yield respectively an inter-rater agreement of 0.92 (p=0.0186) and 0.97 (p=0.0074), indicating a very high agreement consistency of the raters on whether feedback messages are motivational or directive (Gwet, 2008).

In line with prior work highlighting the importance of feedback valence and rejections (Beretta, 2018; Piezunka & Dahlander, 2019) we also coded negative-tainted or *rejection feedback* that is not intended to direct or motivate employees. The motivational and directive feedback in our sample can in that light be interpreted as positive feedback, as they are intended to help ideas develop further through stimulating employees or directing them in the right direction. The inter-rater agreement of what feedback commentaries are rejection feedback is considered high as there is a 90 percent agreement between the raters and a Cohen Kappa of 0.44 (p=0.051) and Gwet's AC1 of 0.88 (p=0.013). The lower Cohen Kappa coefficient is the result of the small number of rejection feedback (n=19) in the total set of comments (n=848), which is a known limitation of this coefficient. Table 12 exemplifies several motivational, directive and rejection feedback comments from the data.

The variables directive and motivational feedback are measured in a cumulative way as the total number of directive or motivational feedback messages that an idea has received from the beginning of the idea contest until the end of a specific development stage. The underlying reason why we use cumulative measures is that we are interested in all the feedback that an idea holder has been able to implement before it is evaluated at the gate following a specific development stage. For example, for evaluation decisions at the third gate, we count the total number of feedback messages until the end of the third development stage.

**Table 12: Examples of Directive, Motivational Feedback and Rejections**

| | |
|---|---|
| *Directive Feedback* | *"In case it's not yet part of your idea: it would also be nice to receive registered letters via your digital mailbox where you can sign them when received. This also avoids the sorry notes when you are not at home and you need to pick up the letter at the post office during working hours. "*<br><br>*"Where would you generate your revenues? Would you ask the airline companies a fee or rather charge the customers using this application?"* |
| *Motivational Feedback* | *"Excellent idea!!"*<br><br>*"Interesting, eager to know how this idea will take shape. Good luck guys!"* |
| *Rejection feedback* | *"Reminds me of the time you re-invented the wheel !"*<br><br>*"Pretty sure this is illegal."* |

We used text content analysis in NVivo to measure *similarity* in feedback content. Before computing similarity coefficients, we used the NVivo software package to pre-process feedback messages for valid similarity comparisons. We did so by first removing punctuations, white spaces and stop words such as 'if', 'and', 'or', 'when' from the feedback texts. Next, we turned all the words to lowercase. Finally, we stemmed each word to its root form. Similar procedures to text content analysis can be found in the study of Beretta (2017) to compute idea content similarity and by Piezunka & Dahlander (2019) to investigate matching interests of idea contributors and organizations in feedback messages. To measure the similarity of two feedback messages, we calculated Jaccard coefficients, by dividing the number of unique keywords in the intersection of two messages by the number of unique keywords in the union (Goldberg et al., 2016; Arts et al., 2018). Jaccard coefficients take values from zero to one, with zero indicating no overlap and one indicating that two messages are identical. We computed feedback similarity coefficients for directive feedback only, as motivational feedback messages essentially always cover the same message of cheering.

The variable feedback similarity is constructed from all directive feedback messages that an idea has received from the beginning of the idea contest until the end of a specific development stage. The variable counts the number of pairs of feedback messages whose content partly overlaps, measured by a Jaccard coefficient above 0.10. The choice for a threshold of 0.10 is based on an inspection of the

values of the Jaccard coefficient and a human evaluation of the similarity of corresponding feedback messages.[4] Feedback messages with a Jaccard coefficient lower than 0.10 are in most cases different in content, while feedback messages with a Jaccard coefficient higher than 0.10 partly overlap in content. The seemingly low threshold value for identifying similar feedback messages is partly due to the fact that our approach does not take synonyms into account.

In table 13 we provide two examples of ideas, the feedback messages obtained, and the corresponding Jaccard similarity coefficients. The first idea example relates to a 'fully digital immersed restaurant experience' where making reservations, checking the menu, ordering, billing and rating is done with a digital app instead of using waiters. A first feedback message highlights a potential pitfall; the loss of social connection might cause customers to not order aperitifs or digestives – which commonly is recommended by a waiter – and to limit the possibility for a customer to ask about the ingredients in certain dishes. The second feedback message emphasizes these points as well but offers some suggestions on how to tackle those (for instance: adding ingredients in the digital menu and keeping the waiter on for aperitives and digestives). The Jaccard coefficient indicates a text similarity of 0.14. The third feedback message discusses an external start-up who is using a digital app to order drinks and food. The third message seems unrelated to the previous feedback messages, which is reflected in Jaccard similarity coefficients that fall below the coefficient threshold. The second idea example concerns a digital app that would enable automatic check-in in airports, delivering mobile boarding passes and seat reservations. A first feedback message suggests to include an add-on to the app so that family or friends could be informed in case your flight is delayed or cancelled. The second and third feedback message discuss the revenue side of the idea, pondering questions on the fee structure of the app. The second feedback suggests charging a fee to users of the app, while the third feedback opens up this question asking the idea holder whether a fee could be charged to the user or the airline

[4] Jaccard similarity scores for pairs of directive feedback messages vary between 0 and 0.28. Similar empirical results are obtained when a higher threshold of 0.15 is used to identify similar feedback messages.

Table 13: Examples of Feedback Similarity

| | | | |
|---|---|---|---|
| ***Idea 1 (summary)*** | *An idea that suggests a 'full digital restaurant experience', where the role of the waiter is replaced by a tablet, allowing people to take their orders by themselves. The intent of the idea was to digitize the customer restaurant experience from booking tables, to ordering, to entertaining, and after-services such as billing and customer survey.* | | |
| *Feedback #1* | *"Not a technological point-of-view, but notice that with this process, waiters and waitresses can't propose you an aperitif; sometimes you agree to order one, but if it is just a bullet on an iPad, you likely won't take it. And sometimes if there is a good atmosphere at your table, "The house" offers you some digestives; once again it won't happen with an app. An additional problem, quite often people don't know what the ingredients of a meal are, and with this they will not be allowed to ask it to a waitress.* | | |
| *Feedback #2* | *"I think the app would be actually great to show the ingredients in a meal. It would be very easy to look it up. Adding to this, restaurants could share which ingredients they have in house for that day and people could create their own dishes and order it (assuming the cook is good enough to make something extraordinary out of it). Regarding the 'aperitif' or 'digestives of the house' the waiter or waitresses can still propose this."* | | |
| *Feedback #3* | *"Some friends of mine have a start-up that tried to accomplish the same: http://youbba.com/?page_id=27. The app works like this: Each table has got a QR-code. The user should scan this code and when he does, the menu is shown. The user can add drinks to his basket and press the "order" button to send the drinks to his table. They are now working on similar ideas for aviation and hospitals. The app you describe has much more functionality and potential and I'm pretty sure there is a market for this."* | | |
| *Jaccard similarity coefficient* | Feedback 1 & 2<br>0.15 | Feedback 1 & 3<br>0.03 | Feedback 2 & 3<br>0.04 |
| | | | |
| ***Idea 2 (summary)*** | An idea that suggests a digital app that gathers all your travel details & information, informs you of your travel ahead, change of gates, flight delay and automatically checks you in for your flight (delivers mobile boarding passes & seat reservation). | | |
| *Feedback #1* | *Another possible add-on is that it informs your friends/family when your flight is delayed. So, people are not trying to pick you up in vain...* | | |
| *Feedback #2* | *I would incorporate this in an existing app. Maybe give it for free the first 6 months and then ask a fee at the customers.* | | |
| *Feedback #3* | *Where would you generate your revenues? Would you ask the airline companies a fee or rather charge the customers using this application?* | | |
| *Jaccard similarity coefficient* | Feedback 1 & 2<br>0.0 | Feedback 1 & 3<br>0.0 | Feedback 2 & 3<br>0.14 |

companies. The overlap between these two feedback messages is above the Jaccard threshold (Jaccard coefficient = 0.14). The first feedback message is shown to be unrelated to the second and third feedback.

To test for the moderating influence of the *hierarchical rank* of *feedback providers*, we classified all feedback messages in terms of the hierarchical rank of the feedback provider. Apollo Belux is organized according to a clear linear hierarchical structure, in which employees start in a job as analyst (37% of employees in 2016) and then grow to become consultant (28% of employees in 2016), manager (31% of employees in 2016) and possibly director (4% of employees in 2016). We classified feedback as either provided by high hierarchy employees (directors or managers) or low hierarchy employees (consultants and analysts). We do so separately for directive and motivational feedback messages. A similar classification is adopted to examine the moderating influence of the *hierarchical rank* of *feedback recipients*. Hereby, we classify idea holders (key contact person for an idea) into a high hierarchy (directors or managers) group and a low hierarchy (consultants and analysts) group.

#### 2.4.1.3 Measures – Control Variables

We control for multiple factors that might interfere the relationship between our dependent variable, the survivorship of ideas in idea contests, and the focal feedback variables. In particular, we control for differences in feedback length, initial quality of ideas, composition of teams, and differences in idea challenges and idea contests.

First, we control for *feedback length*. Feedback messages can vary in length, indicating their elaborateness or approximating the amount of information they hold (Zhu et al., 2018). To measure feedback length, we used a word count command to compute the number of words of every feedback message. We then calculated the average word count of all feedback messages that an idea has received until the end of specific development stage.

Second, we include indicators of the *initial quality of ideas* as they have been submitted at the start of the idea contest, as they are likely to correlate with the amount of feedback that ideas receive. To control for this, three evaluators rated each initial idea description on a set of idea quality criteria. The evaluators are innovation experts who have profound experience in idea development guidance and coaching and are frequently part of innovation expert panels. As outlined by organizational creativity

theory, an idea that is both novel and useful is defined as a creative and high-quality idea (Amabile, 1996; Dean et al., 2006). Usefulness relates to whether an idea is feasible, has a high value potential and is specific (Dean et al., 2006; Amabile & Hennessey, 2011; Adamczyck et al., 2011; Poetz & Schreier, 2012). The criteria and their definitions are presented in table 13. Each criterion is assessed on an ordinal scale ranging from 0 to 5. The assessments of the three evaluators have a percentage agreement for the different quality criteria of around 90% and Brennan and Prediger and Gwet AC's value of inter-rater agreements between 0.6 and 0.7, indicating moderate inter-rater agreement. The measures of initial idea quality are calculated as average scores of the three innovation experts.

Table 14: Definitions of Initial Idea Quality Criteria

| **Idea Criteria** | **Definition** |
|---|---|
| Novelty | The degree to which an idea is original, ingenious, imaginative or surprising |
| Feasibility | The degree to which an idea can be easily implemented and does not violate known constraints |
| Value Potential | The degree to which an idea has potential to create value for a customer, ecosystem or the internal organization |
| Specificity | The degree to which an idea is specific, clearly conveyed, worked out in detail |

*All definitions are derived from Dean, D. L., Hender, J., Rodgers, T., & Santanen, E. (2006)*

Third, we control for differences in the composition of teams participating to the idea contests. A first variable that we control for is *team size*, measured as the number of employees that is working on an idea. While most research demonstrates that team size positively affects creative performance (West & Anderson, 1996; Taylor & Greve, 2006), some studies show that increasing the number of team members too much can strain the creative process (Bercovitz & Feldman, 2011). We are therefore testing for a non-linear effect of team size and include both a linear and quadratic term of team size in our analyses.

Further, we control for *functional diversity* of teams. Heterogeneous teams that combine different functional backgrounds have a more diverse knowledge base (Faraj & Sproull, 2000; Taylor & Greve, 2006; Zhu et al., 2017) and may be superior when performing creative work (Bercovitz & Feldman, 2011). Functional diversity is measured by a dummy variable that takes a value equal to one when the team includes members with a technology and a business background.

Next to functional diversity, we also control for *gender diversity* within teams. The workforce of Apollo Belux comprised a 70/30 male/female distribution at the end of 2016. Gender diversity in teams has been shown to affect risk-taking behaviour and social cohesion which might influence creative behaviour and performance (Martin & Good, 2015; Perryman et al., 2016). Gender diversity is coded as a dummy variable that takes the value one if there are both females and males within a team. Another team characteristic that we control for is the presence of members with a high hierarchical rank within a team. Prior work has indicated that employees with a high hierarchical rank often are successful innovators (Baldridge & Burnham, 1975; Ibarra, 1993; Reitzig & Maciejovsky, 2015; Keum & See, 2017). The variable *manager presence* indicates in a binary fashion whether the team contains at least one manager or director. Finally, we control for the *average age* of the team members, as a proxy for work experience accumulated by the team (Schneid et al., 2016).

As idea contests take place within the same organisation over multiple years, we additionally control for *repeated entry* of idea holders as there might have occurred learning effects when participating in multiple consecutive idea contests (Deichmann & Van den Ende, 2013; Kar, Whiting & Noble, 2016). The variable *repeated entry* takes a value one if at least one team member participated in an idea contest before. We also control for whether ideas are submitted to an open call for ideas or to one of the specific innovation challenges. As suggested by Piller & Walcher (2006), ideas that are submitted to an open call might be more wild and less likely in line with the strategic focus and capabilities of the company (Piller & Walcher, 2006; Boudreau et al., 2011). The variable *open call for ideas* is a dummy that takes a value one if a specific idea responded to the open call for ideas.

Finally, we document and control for differences between the three editions of idea contests. Based on interviews with the idea contest organizers, we found that the overall idea contest design over the years was unchanged: the same number of development phases and evaluation gates were used, the incentives for participation and the rewards for winners were kept the same each year, the same evaluation criteria were used, the same idea platform was used in support, the idea contests had the same corporate sponsor, and the idea contests occurred at the same dates in the calendar year. One element that was noted to differ between the three idea contests is the number of ideas submitted. When more ideas enter the idea contest, the probability of an individual idea to proceed far in an idea contest

logically decreases because the number of ideas that are allowed to move through the specific phases is predetermined towards the end, as is the number of winners per year. As demonstrated by Boudreau et al. (2011), when the number of competitors increases contestants will perceive their probability of success to be lower, which might result in less effort exerted. We therefore control for the *number of idea submissions* per year in our analyses.

### 2.4.2 Methodology – Survival Modelling

To estimate the effect of feedback on the development of ideas in an idea contest, we use survival regression models. Survival models are increasingly used in social sciences when there is a need to understand a) the time of a failure event and b) how certain treatments (such as feedback) alter the probability for subjects to survive over a given time (Hosmer et al., 2008; Cleves et al., 2010; Fleming & Harrington, 2011; Leten et al., 2016). Survival regression models in our study are used to predict the probability for an idea to survive a number of development phases that end at evaluation gates (n=5) where ideas of lesser quality are eliminated. The semi-parametric Cox proportional hazard model (Cox, 1972) is selected for this purpose because this model requires no upfront assumption concerning the distributional properties of the baseline hazard rate $h_0(t)$ of exiting the idea contest. The Cox model allows the baseline hazard to take any form the data suggests and thus be directly fitted from the data. The Cox model specifies the hazard h(t) that a certain idea exits the idea contest at time t as the product of a baseline hazard and an idea-specific hazard, with the latter modelled as an exponential function of the model parameters and regressors.

## 2.5 Empirical results

### 2.5.1 Idea and Feedback Example

Before we present the results of our empirical analysis, we first provide an example of an idea of our sample and illustrate how the idea and the idea holder were influenced by the feedback that was provided during the idea contest. We base ourselves on information from the Yambla idea management platform and a semi-structured interview with the idea holder.

The idea example was one of the three winners of the idea contest in 2015. The idea is titled ‘Eatify’, which is an idea for a double-sided food or meal sharing platform, that would enable people

to order home cooked meals by connecting them with hobby chefs and home cooks. Or as originally posted on the idea contest platform:

> 'Think about this for a second: We are all busy people, right? This often means that there is no time left to make a proper meal. Don't we all like healthy and freshly made food? Of course, we do. We believe that people are fed up with the limited choices for affordable fresh and healthy food delivered at home. People crave for new food experiences and food is being embraced as a vehicle for self-expression and storytelling. Eatify will enable people to order home cooked meals by connecting them with enthusiastic home cooks from the neighborhood. We call them Eatifiers and Cookifiers. Our platform will give Eatifiers an overview of which meals are available in their neighborhood. Users will have the possibility of exploring home cooked meals based on diet, allergy, cook, cuisine, location and popularity. Eatifiers can choose between take away or delivery. Eatify enables Cookifiers to take their passion to the next level. The platform will facilitate them to distribute their famous meals. So, what is in it for them? By commercializing their passion, they can basically eat for free or even earn extra money out of it. Eatify will give you the opportunity to order freshly cooked meals and finally try out that famous stew pot from around the corner where everyone is talking about.'

As the idea holder explains, this idea was submitted together with two team members who were business analysts at the digital department, while he started his first year at the company as business analyst in the strategy department. When asked about the idea contest and about the idea development that occurred, the idea holder shared the following:

> "I would say the core idea did not change. We stayed close to the core idea...which is connecting the cookifiers to the eatifiers. So, the value proposition itself did not change. What we started to do is build peripherals around the idea, like aspects regarding food safety, adding a business model canvas... So obviously the idea evolved a lot... In the beginning, there was just this... (initial idea subscription) ... a very rudimentary idea. This is the value proposition, which makes sense, yes. But how to make a business out of it, that is actually what we did through the (idea contest) track."

The Eatify idea received seven feedback messages (see table 14 for a full overview): five directive feedback messages and two motivational feedback messages.

**Table 15: Eatify idea example – directive and motivational feedback**

| | |
|---|---|
| *Feedback #1* | *"A thing to pay attention to: food safety regulation and what if people get ill after eating via the Eatify platform?"*<br>- From a business analyst at strategy department |
| *Feedback #2* | *"Airbnb or Uber for food. Just brilliant and fully in line with the sharing economy. Go for it, get out of the building and test your idea with potential Eatifiers and Cookifiers."*<br>- From a director at digital department |
| *Feedback #3* | *"How do you differentiate from existing players? (e.g. https://www.platmaison.fr/ http://www.super-marmite.com/)"*<br>- From a business analyst at the communications, media & technology department |
| *Feedback #4* | *"How would you minimize the risk for the Cookifiers of not having a consumer for what they have prepared or for what they have bought the ingredients? You could perhaps include frozen meals to (partly) overcome this. Secondly, I think a close look should be taken at tax legislation to inform your Cookifiers on how to incorporate this in their tax declaration."*<br>- From a manager at the digital department |
| *Feedback #5* | *"Just a couple of thoughts: How to balance supply and demand? How will the eatifiers pay for their meal? What type of delivery service will you offer?"*<br>- From a business analyst at the strategy department |
| *Feedback #6* | *Like eatify! i feel like being Cookifier in the weekend, and Eatifier in the week ;-)*<br>- From a manager at the finance department |
| *Feedback #7* | *"My main worry would be to know who is cooking (in which hygiene condition) - I guess it would be important to have a good profile of the Cookifiers, and a social rating system so you know what others thought about it..."*<br>- From a director at the products department |

The very first feedback the team received (feedback #1*)* from a business analyst at the strategy department was the directive feedback to pay attention to the food safety & hygiene regulations and to think about what could happen if someone would get ill after eating via the food sharing platform. As the idea holder illustrates:

> "Obviously, it makes sense food safety & regulation being asked. Because this question was being asked, it forces you to basically think about this. And it is not that we did not think about it (beforehand), but it is because someone asks it that you also get the validation that other people are thinking about it. It is one of the first things that are on someone else's mind, so we need an answer to this question.

A second feedback (feedback #2), send by one of the directors of the digital department, was a motivational feedback message that he found the idea 'brilliant' and 'fully in line with the sharing economy' (which was one of the idea challenge topics of the idea contest) and that the team should 'go for it'. As the idea holder recollects:

> "Obviously, this is a very encouraging comment. It is a message from (Apollo Belux's) leadership, which by the time we were analysts, it makes you feel connected with the company, as well with the leadership that you get the acknowledgement from them, that like "Guys, just go for it! This is an interesting idea." This comment puts a smile on my face right now again, it gives you energy to keep going. It is nice to hear this from a person like (name of director) back in the time. He was at that time director of Apollo Belux digital department, which was... my team member M. was working for the digital department. I was working for the strategy department. So, this was the direct leadership of M., so obviously this is great for young people who just started their career at the company to hear. And it gives you energy to keep putting in the long hours working on the idea."

After that the team received more directive feedback, one which posed the question how they would differentiate from existing players (feedback #3), another directive feedback that focused on the cooks on the platform, proposing the use of frozen meals and/or to incorporate the sale of meals in their tax declaration (feedback #4), and a directive feedback that referred to the balancing of supply and demand, and the delivery services that will be offered (feedback #5). The idea holder explained that those comments prompted the team to think about these important matters. The team decided not to offer frozen meals on the platform (although this would help to balance supply and demand) because they felt that the provision of frozen food was not in line with their focus on healthy and fresh food.

Further in the idea contest, the team received a second motivational feedback message (feedback #6) from a manager at the finance department and a final directive feedback message (feedback #7)

from a director at the products department which returns to the point of the first feedback message: food hygiene & safety. Although similar in topic, the latter feedback adds the recommendation to use a social rating system to tackle the food hygiene issue. As the importance of food safety was repeatedly pointed out, the team decided to refine their idea and add a social rating system for cooks to their platform. As the idea holder explained:

> "Basically, the same feedback as the first feedback comment. This is again about the hygiene profile. But here, this person already gives the solution to the issue. It is like 'I would be concerned about the hygiene, so maybe add a social rating system.' So indeed, we knew this was going to be a concern from the first comment that we received, but here they already gave us a very good idea how to answer that. It is like a recommendation, we read, and it made sense. "

At the finals gate of the idea contest, where ten ideas were considered, the 'Eatify' idea was announced as one of the three winning ideas of the 2015 Apollo Belux idea contest. As a reward, the team behind the idea could continue to work full-time on bringing their idea to market, while being supported by Apollo with a given continuation of their salary for the next three months. During the next months, the team moved to an incubator, where they developed a beta-version of the platform. After the release of the beta-version in the fall of 2015 and positive reactions from the first users, the final platform was launched in Antwerp, and later in Ghent, Belgium. By December 2015, the team had won two prestigious business plan competitions in Belgium and the United States. Shortly after, the venture closed an investment round of 450.000 EUR with an early-stage venture firm. By fall 2016, the platform hosted 1.200 registered 'home-chefs', 5.000 'foodies' and 7.000 sold meals and the team had grown to eight members and some additional freelancers.

Over the next two years, the start-up started to face certain problems. In September 2017, the founders decided together with the venture capital investors to restructure and reduce costs. In May 2018, the founders and investors closed the books. The founders attribute the fall of the platform to two reasons, being the suboptimal convenience for the users and the double-sided nature of the platform. As one of the co-founders illustrates:

> *"We took away a large part of the convenience. I think today everybody knows about Deliveroo and UberEATS. What are the strengths there? I am hungry now; I take my smartphone and 30 minutes later the food is delivered to my door. With our platform, this was different. You needed to order a couple of days in advance with a hobby-chef. Which also means that there was more authenticity. But the*

*convenience was less. You also had to go pick up the food yourself. And … in the end 'convenience is the new loyalty' … so that this was one thing that halted the growth of our platform.*

*Another aspect is that our platform was a two-sided market. And two-sided markets are hard… You need to reconcile two markets, which means that you need to have two product-market fits, you need to do marketing for each market…. You need to focus on two different aspects, and you do not have real control over any of the two. If there is a large peak of demand for lasagnes, then there also must be a large supply of lasagnes, and vice-versa. Admittedly, we knew that already. Yet it did not discourage us to start... But, retrospectively, it did not make it easier to start our venture like that.* "

Looking back at the feedback that the team received during the idea contest, it was already pointed out at that time to think about 'ways to balance supply and demand' and 'the type of delivery services' (feedback #5). Presently, the team behind the food sharing platform continues their journey as innovators as they have founded two other start-ups and have become board members in venture investment and advisory firms.

## 2.5.2 Descriptive Statistics and Correlations

Table 16 displays the descriptive statistics and correlations of the independent variables. Regarding our variables of interest, each idea receives on average almost two directive feedback messages, ranging between 0 and 24 messages. Separated based on the hierarchical rank of feedback providers, ideas receive on average 0.97 directive feedback messages from low hierarchy employees and 0.83 from high hierarchy employees. On average only one in three ideas receives a motivational feedback message, with 12 messages being the highest amount. When separated in function of hierarchical ranks of feedback providers, ideas receive about the same number (0.15) of motivational feedback messages from employees with low and high hierarchical ranks. In total, we observe only 28 rejection feedback messages, or 0.04 messages per idea. Feedback similarity has an average value of 0.09, which indicates that ideas receive, on average, in 9 percent of the cases similar feedback messages.

Table 16: Summary Statistics and Correlations

| | | Mean | Std.Dev. | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) | (19) | (20) | (21) | (22) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | Directive feedback | 1.803 | 2.825 | 1 | | | | | | | | | | | | | | | | | | | | | |
| (2) | Directive feedback from high hierarchy employees | 0.832 | 1.321 | **0.77** | 1 | | | | | | | | | | | | | | | | | | | | |
| (3) | Directive feedback from low hierarchy employees | 0.971 | 1.982 | **0.90** | **0.44** | 1 | | | | | | | | | | | | | | | | | | | |
| (4) | Motiv. Feedback | 0.305 | 0.816 | **0.51** | **0.35** | **0.49** | 1 | | | | | | | | | | | | | | | | | | |
| (5) | Motiv. feedback from high hierarchy employees | 0.152 | 0.487 | **0.37** | **0.31** | **0.32** | **0.82** | 1 | | | | | | | | | | | | | | | | | |
| (6) | Motiv. feedback from low hierarchy employees | 0.153 | 0.494 | **0.48** | **0.28** | **0.51** | **0.83** | **0.38** | 1 | | | | | | | | | | | | | | | | |
| (7) | Rejection feedback | 0.042 | 0.262 | **0.23** | **0.13** | **0.25** | **0.31** | **0.17** | **0.33** | 1 | | | | | | | | | | | | | | | |
| (8) | Feedback similarity | 0.093 | 0.459 | **0.37** | **0.23** | **0.38** | **0.29** | **0.20** | **0.28** | **0.19** | 1 | | | | | | | | | | | | | | |
| (9) | Feedback text length | 28.18 | 33.237 | **0.31** | **0.34** | **0.21** | 0.09 | **0.08** | **0.07** | 0.03 | **0.09** | 1 | | | | | | | | | | | | | |
| (10) | Novelty | 2.356 | 0.612 | 0.12 | **0.13** | **0.08** | 0.05 | 0.03 | 0.05 | -0.01 | -0.03 | **0.19** | 1 | | | | | | | | | | | | |
| (11) | Feasibility | 2.788 | 0.557 | -0.01 | 0.01 | -0.02 | -0.00 | -0.02 | 0.02 | **-0.09** | 0.03 | 0.00 | **0.22** | 1 | | | | | | | | | | | |
| (12) | Value creation potential | 2.455 | 0.596 | 0.07 | **0.03** | **0.08** | 0.09 | **0.07** | **0.09** | 0.02 | -0.03 | 0.03 | **0.51** | **0.34** | 1 | | | | | | | | | | |
| (13) | Specificity | 2.855 | 0.741 | **0.20** | **0.17** | **0.18** | 0.04 | 0.00 | **0.07** | -0.02 | **0.12** | **0.18** | **0.36** | **0.38** | **0.29** | 1 | | | | | | | | | |
| (14) | Team size | 2.255 | 1.379 | **0.09** | 0.02 | **0.12** | 0.11 | 0.05 | **0.12** | 0.04 | 0.00 | **0.06** | **0.24** | **0.08** | **0.07** | -0.03 | 1 | | | | | | | | |
| (15) | Team size (squared) | 8.450 | 8.352 | **0.07** | -0.01 | **0.11** | 0.07 | 0.02 | **0.09** | 0.05 | -0.00 | **0.10** | **0.23** | **0.10** | **0.09** | -0.02 | **0.97** | 1 | | | | | | | |
| (16) | Functional diversity | 0.422 | 0.494 | 0.12 | **0.06** | **0.13** | 0.07 | -0.01 | **0.12** | 0.02 | 0.04 | -0.01 | **0.13** | **0.08** | -0.14 | **0.00** | **0.66** | **0.56** | 1 | | | | | | |
| (17) | Manager presence | 0.624 | 0.498 | 0.08 | **0.08** | 0.06 | 0.04 | 0.07 | -0.01 | **0.07** | **-0.07** | **0.10** | **0.19** | **0.01** | **-0.01** | **0.08** | **-0.38** | **-0.33** | -0.22 | 1 | | | | | |
| (18) | Gender diversity | 0.287 | 0.453 | 0.22 | **0.12** | **0.25** | **0.19** | **0.15** | **0.18** | **0.08** | **0.08** | **0.09** | -0.01 | -0.03 | -0.07 | **-0.09** | **0.48** | **0.44** | 0.33 | 0.22 | 1 | | | | |
| (19) | Average age | 29.59 | 3.393 | 0.01 | 0.06 | -0.03 | -0.02 | 0.02 | -0.05 | 0.06 | -0.05 | 0.05 | -0.05 | -0.02 | 0.00 | **0.07** | **-0.21** | **-0.19** | -0.11 | 0.39 | -0.06 | 1 | | | |
| (20) | Repeated entry | 0.391 | 0.488 | **-0.14** | **-0.15** | **-0.11** | -0.02 | -0.01 | -0.02 | **-0.06** | -0.02 | -0.13 | 0.03 | -0.04 | **0.15** | **-0.20** | **0.32** | **0.31** | 0.16 | 0.03 | 0.06 | -0.10 | 1 | | |
| (21) | Open call for ideas | 0.709 | 0.454 | -0.12 | **-0.09** | **-0.11** | -0.012 | 0.00 | -0.02 | **-0.07** | -0.00 | -0.08 | 0.03 | -0.02 | -0.07 | **-0.01** | **-0.08** | **-0.09** | -0.02 | -0.02 | -0.05 | -0.03 | **0.08** | 1 | |
| (22) | N° of submissions per year | 133.40 | 22.52 | **0.30** | **0.25** | **0.26** | **0.16** | **0.11** | **0.15** | **0.11** | **0.11** | **0.24** | -0.00 | -0.01 | **0.01** | **0.25** | **-0.18** | **-0.18** | **-0.08** | **0.12** | **0.10** | **0.36** | **-0.61** | **-0.16** | 1 |

*Significant correlations at 5 percent level are expressed in bold*

Feedback messages have an average length of 46 words.[5] Further, there exists considerable variation across ideas in their initial quality. Teams have on average 2.25 employees: 180 of the ideas are carried out by individuals while 215 ideas are generated and developed by teams, with a maximum size of 7 employees. Around 42% of the teams are functionally diverse and contain employees from both technology and business departments. In terms of gender diversity, 29% of teams are a mix of males and females. In 62% of the teams there is at least one manager present. The employees who participate are on average almost 30 years of age, and 39% of the teams had at least one team member who participated in a prior idea contest. While each year a series of challenges were formulated, the overall majority of ideas (70%) were submitted to the open call for ideas. Concerning the number of idea submissions, each year differed in the number of ideas submitted to the idea contests. In 2014, 160 ideas were submitted, 127 ideas in 2015 and 108 ideas in 2016. The correlations among the independent variables are not large enough to warrant concerns about multicollinearity. The average variance inflation factor has a mean value of 3.84 across the different regression models. The highest correlations exist between team size and functional diversity (0.66), and between repeated entry and N° of submissions per year (-0.67). We ran alternative models whereby one of the correlated variables is removed and results remained persistent.

## 2.5.3 Regression Results

We test our hypotheses by conducting step-wise survival regression models, reported in Table 6. The reported coefficients are presented as hazard ratios. Hazard ratios represent the change in probability that an idea exits an idea contest due to a unit change in an independent variable. A hazard ratio that is smaller (larger) than one indicates a decrease (increase) in the probability to exit, and hence indicates that an independent variable increases (decreases) the survivability of an idea during an idea

[5] The average text length of feedback messages is reported in table 16 as having a lower amount of words (28 words on average). This is because there are observations (ideas) with no feedback, resulting in a zero feedback text length observation.

contest. Model 1 presents the baseline model and contains only the control variables. First, we observe that idea novelty has a significant relationship with the survivability of ideas in an idea contest, while the other idea quality criteria do not. Second, we see that team size has an inverted U-shaped relationship with the survivability of ideas. The optimal team size ranges between 4-5 employees. Third, we find that teams that are diverse, in terms of functional background and gender, and who have a manager in the team generate ideas that survive longer in the idea contests. No significant effects are found for the average age of team members, or for repeated participation in idea contests. Regarding the formulation of challenges, we find that ideas that are submitted to an open call for ideas – rather than to specific challenges - survive less long in idea contests. As expected, ideas advance less far in an idea contest if there are more contestants.

In model 2 we add the directive and motivational feedback variables, and control additionally for rejection feedback and feedback text length. The coefficient of directive feedback is significant and lower than one. This indicates that directive feedback has a positive effect on the survivability and development of ideas in idea contests. This confirms our first hypothesis. One additional directive feedback message lowers the probability that an idea is eliminated at a certain evaluation gate by 6.5%. In contrast, motivational feedback does not show a significant effect. We therefore fail to confirm our second hypothesis that states that motivational feedback has a positive effect on the development of ideas. Furthermore, we find that ideas that receive rejection feedback survive less long in an idea contest. This finding complements prior evidence that rejection feedback reduces the probability that an idea gets selected for implementation (Beretta, 2018; Piezunka & Dahlander, 2019).

In model 3, we add feedback similarity to our regression model. Feedback similarity shows a positive, albeit weak (10% significance), significant relationship with idea survival.[6] This confirms hypothesis 3 which predicts a positive effect of feedback similarity on the development of ideas. The hazard ratio of feedback similarity indicates that the probability that an idea is eliminated at a certain

[6] We note that feedback similarity is significant at the 5% level in some of the supplementary analyses.

Table 17: Cox Survival Regression Models

| | Full sample Model 1 | | Full sample Model 2 | | Full sample Model 3 | | Full sample Model 4 | | High hierarchy Model 5 | | Low hierarchy Model 6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Directive feedback | | | 0.935*** | (0.018) | 0.946*** | (0.017) | | | 0.959 | (0.036) | 0.946*** | (0.018) |
| Motivational feedback | | | 0.944 | (0.048) | 0.950 | (0.047) | | | 1.113 | (0.089) | 0.868*** | (0.044) |
| Directive feedback from high hierarchy employees | | | | | | | 0.932* | (0.036) | | | | |
| Directive feedback from low hierarchy employees | | | | | | | 0.957* | (0.023) | | | | |
| Motivational feedback from high hierarchy employees | | | | | | | 0.939 | (0.074) | | | | |
| Motivational feedback from low hierarchy employees | | | | | | | 0.960 | (0.077) | | | | |
| Rejection feedback | | | 1.265** | (0.123) | 1.338** | (0.157) | 1.324** | (0.154) | 1.443** | (0.234) | 1.573** | (0.286) |
| Feedback similarity | | | | | 0.819* | (0.087) | 0.817* | (0.086) | 0.723 | (0.248) | 0.894 | (0.068) |
| Feedback text length | | | 0.999 | (0.001) | 0.999 | (0.001) | 0.999 | (0.001) | 0.998 | (0.002) | 0.999 | (0.001) |
| Novelty | 0.736*** | (0.056) | 0.761*** | (0.057) | 0.746*** | (0.056) | 0.748*** | (0.058) | 0.571*** | (0.067) | 0.905 | (0.088) |
| Feasibility | 1.037 | (0.067) | 1.018 | (0.071) | 1.009 | (0.070) | 1.012 | (0.070) | 0.988 | (0.136) | 0.998 | (0.085) |
| Value creation potential | 0.964 | (0.065) | 0.962 | (0.068) | 0.972 | (0.063) | 0.967 | (0.064) | 1.325 | (0.165) | 0.794*** | (0.067) |
| Specificity | 0.979 | (0.065) | 1.012 | (0.065) | 1.016 | (0.069) | 1.014 | (0.070) | 0.986 | (0.100) | 1.087 | (0.086) |
| Team Size | 0.438*** | (0.048) | 0.450*** | (0.048) | 0.384*** | (0.049) | 0.386*** | (0.050) | 0.258*** | (0.103) | 0.369*** | (0.060) |
| TeamSize (squared) | 1.097*** | (0.020) | 1.090*** | (0.021) | 1.111*** | (0.021) | 1.090*** | (0.022) | 1.198** | (0.049) | 1.110*** | (0.026) |
| Functional diversity | 0.826 * | (0.075) | 0.822* | (0.067) | 0.885 | (0.072) | 0.887 | (0.081) | 0.717*** | (0.131) | 1.078** | (0.136) |
| Manager presence | 0.851 * | (0.076) | 0.849* | (0.072) | 0.831** | (0.077) | 0.832** | (0.074) | 0.591 | (0.221) | 0.889 | (0.114) |
| Gender diversity | 0.768** | (0.071) | 0.847 | (0.084) | 0.842* | (0.083) | 0.839 | (0.083) | 1.004 | (0.162) | 0.827 | (0.123) |
| Average Age | 1.002 | (0.009) | 0.999 | (0.009) | 1.002 | (0.010) | 1.003 | (0.009) | 1.012 | (0.017) | 1.006 | (0.012) |
| Repeated Entry | 0.949 | (0.121) | 0.955 | (0.111) | 0.953 | (0.117) | 0.949 | (0.115) | 1.215 | (0.315) | 0.886 | (0.119) |
| Open call for ideas | 1.192* | (0.126) | 1.147 | (0.106) | 1.174* | (0.106) | 1.174 | (0.112) | 1.118 | (0.171) | 1.078* | (0.111) |
| N° of submissions per year | 1.006** | (0.003) | 1.008*** | (0.003) | 1.008** | (0.003) | 1.008*** | (0.003) | 1.011 | (0.005) | 1.004 | (0.003) |
| Number of subjects | 395 | | 395 | | 395 | | 395 | | 137 | | 258 | |
| Time at risk | 998 | | 998 | | 998 | | 998 | | 343 | | 655 | |
| Log Likelihood | -2011,18 | | -2005,91 | | -2004,87 | | -2004,79 | | -552,21 | | -1189,97 | |
| Wald Chi2 | 278.06*** | | 369.38*** | | 371.01*** | | 374.16*** | | 150.00*** | | 297.33*** | |
| LR Test vs. Model 1 | | | 10.54** | | 12.60** | | 12.93* | | 3.61 | | 10.54* | |

Hazard ratios and standard errors (in parentheses) are reported; *, **, *** indicate significance at 10, 5, and 1 percent level.

evaluation gate decreases with 29.5% if an idea receives two similar feedback messages. The inclusion of feedback similarity has no material effect on the coefficients of the other feedback variables.

In model 4, we split up directive and motivational feedback into two separate categories that represent the high or low hierarchical rank of the feedback providers. The results show that directive feedback has a significant positive effect on the survivability of ideas in idea contests, regardless of the hierarchical rank of the feedback provider. A Wald test is performed to compare the hazard ratios of the directive feedback variables for the different hierarchical ranks, but no significant differences (chi2 = 0.23; p = 0.63) are found. Motivational feedback is shown to be insignificant, regardless whether feedback is given by high or low ranking employees. We therefore reject hypothesis 4 that argues that feedback from feedback providers with a high hierarchical rank has a larger positive effect on the development of ideas than feedback given by feedback providers with a low hierarchical rank.

Finally, we examine whether the effects of directive and motivational feedback are moderated by the hierarchical rank of the feedback recipients. For this, we estimate regression model 4 for separate samples of feedback recipients with a high hierarchical rank (model 5) and feedback recipients with a low hierarchical rank (model 6). Directive and motivational feedback are shown to be significant when the feedback recipient has a low hierarchical rank, but insignificant when the feedback recipient holds a high hierarchical rank. We therefore confirm hypothesis 5 that states that directive and motivational feedback have a larger positive effect on the development of ideas when received by feedback recipients with a low hierarchical rank rather than by feedback recipients with a high hierarchical rank.

## 2.5.4 Supplementary analyses

We performed a number of supplementary analyses to test the robustness of our findings. These results are not reported here for reasons of space. First, we explored whether using alternative measurements of feedback would change our results. We switched the cumulative count of feedback for a) a binary indicator that indicates whether an idea received any feedback, b) a non-cumulative count of feedback that only takes into account feedback that is given during the development stage that is preceding the gate where an idea is evaluated. The main results regarding directive and motivational feedback are confirmed in these models. Second, we tested whether there is an interaction effect

between directive and motivational feedback. We find no evidence of an interaction effect, while adding the interaction effect has no influence on the main effects of directive and motivational feedback.

Next, we have tested whether our results are influenced by any remaining differences across the three idea contests. The overall set-up and procedure of the idea contests were close to identical for each of the three editions. The only difference on idea contest level that is apparent (and controlled for) is the number of ideas entering into each idea contest, as there is decline in number of ideas submitted to each idea contest edition. To check if there are not any remaining differences between idea contests, we replaced the variable number of idea submissions with a set of dummies for the three idea contests. While the dummy for the tournament in 2016 was significant, the main results remained robust.

Finally, feedback is likely not fully exogenous as feedback providers decide freely to which ideas they provide feedback. While we deal with this endogeneity concern by including a large set of controls in our analyses, we apply a test to compare the effect of feedback in different stages. We check in what stages feedback affects idea development, and in which stages it does not, using a specific feature of the design of the idea contests. Typically, feedback that is given within a stage can be used to develop or refine an idea right away in that very stage still. Yet, the very first stage marks the exception, as during the first stage - the submission stage - of the idea contest, the submitted ideas are frozen on the platform and only released for editing after gate one. Although they are frozen for editing, the ideas already can receive feedback. Therefore, feedback given in the first stage cannot and should not be able to influence the probability for ideas to pass the first evaluation gate. Feedback can only start to show an effect from the second evaluation gate onwards when idea holders were able to refine ideas based on the feedback received up until then. We have estimated a logit regression per stage where the dependent variable indicates in a binary fashion whether an idea passes the respective gate or not. We find no significant effect for any of the feedback variables in the first stage. For the second and third stage though, significant effects for directive feedback emerge. This indicates that feedback works only when it is supposed to work, and therefore does not seem to be correlated with an important omitted variable. These results alleviate concerns that our results may be subject to an endogeneity bias.

## 2.6 Chapter Discussion

The central notion of this paper is that feedback plays an important role in the front end of the innovation process by contributing to the stepwise development of ideas. Building on feedback theory we propose that the relationship between feedback and idea development depends on the nature of the feedback given and the characteristics of the feedback providers and recipients. Given the initial quality of ideas, we track the progression of ideas in multi-phased idea contests where ideas of lesser quality are stepwise eliminated, and we relate this to the feedback that ideas have accumulated during the idea contests. Relying on a dataset of three idea contests and 395 ideas that are developed during these idea contests, we find that directive feedback has a positive effect on the stepwise development of ideas. This effect turns out to be larger when different people provide feedback that is similar in content. In contrast, motivational feedback does not show a general positive effect on idea development, except for feedback recipients that occupy low hierarchical ranks in their organization. While we find that the effect of feedback is moderated by the hierarchical rank of feedback recipients, no moderation effect is found for the hierarchical rank of feedback providers.

### 2.6.1 Theoretical Contributions

Our study contributes to the literatures on feedback, the innovation front end and crowdsourcing in several ways. First, we build on and contribute to feedback theory by highlighting the use of distinct types of feedback in an innovation context. Our results confirm that directive feedback positively affects organizational actors in the development of their ideas, while motivational feedback generally does not (Nadler, 1977; Ashford & Cumming, 1983; Balzer et al., 1989; Payne & Hauty, 1995; Zhou, 2008; Ederer, 2010; Zhu et al., 2018). This finding acknowledges the previously proposed notion that feedback can be an effective instrument for stimulating idea development (Majchrzak & Malhotra, 2016; Zhu et al., 2018; Porter et al., 2020). We show that this holds true but particularly when the feedback contains developmental content. Similarity of directive feedback, a hitherto unexplored aspect in the feedback literature, is found to have a positive association with idea development. This implies that repetition of developmental content in feedback is likely not redundant, as previously suggested (Van Swol & Ludutsky, 2003), but in fact can be reinforcing.

Additionally, we add to the feedback theory by investigating the influence of the hierarchical ranks of feedback providers and recipients. Whereas a large body of literature studying feedback in organizations focuses on job performance appraisals, where there often is a linear hierarchical communication of feedback from supervisors to subordinates (Ashford & Cummings, 1983; Ilgen et al., 1979; Zhou, 2008; Ashford & De Stobbeleir, 2016), our empirical context allows for anyone to give feedback to anyone in the organization. Our results imply that the hierarchical rank of feedback providers does not moderate the effects of feedback. Yet, we do find a positive moderating effect of the hierarchical rank of feedback recipients, whereby employees positioned low in the hierarchy are more prone to react to feedback they receive. This finding only partially underscores the traditional perspective that hierarchical influence runs cascading down from the top to the bottom of the organizational structure (Franklin, 1975; March & Simon, 1958; Fodor & Carver, 2000; Reitzig & Maciejovsky, 2015; Keum & See, 2017) as we do not find evidence for a moderating effect of the hierarchical rank of feedback providers. In other words, low hierarchy employees seem not only to listen to feedback from their superiors, but also from their peers. One interpretation could be that low employees might feel more challenged in the development of their ideas and may therefore be more willing to react to feedback given to them.

Second, our findings contribute to the front end innovation literature. Most studies emphasizing the innovation front end have focused on idea generation and selection (Hoornaert et al., 2017; Beretta, 2018). We extend this literature by emphasizing the idea development phase of the front end, where ideas are developed and elaborated from early-concepts to fully corroborated ideas (Griffiths-Hemans & Grover, 2006; Kijkuit & Van den Ende, 2007; Floren & Frishammar, 2012; Perry-Smith & Manucci, 2017). We show that feedback can not only be used to stimulate idea generation (Wooten & Ulrich, 2017; Piezunka & Dahlander, 2019) or as a tool for idea evaluation and selection (Beretta, 2018; Zhu et al., 2018), but feedback also plays an important role in idea development. Our study also indicates that the best ideas at the very start of the innovation front end are not necessarily the best ideas by the end of the innovation front end, which implies that (the quality of) ideas undergo(es) considerable transformation as a result of feedback obtained. Most initial idea quality parameters are not predictive of idea progression and final idea quality, with the exception of idea novelty which is in line with

previous studies that have acknowledged that novelty is an important criterion of idea quality (Dean et al., 2006; Diedrich et al., 2015; Criscuolo et al., 2017).

Finally, our findings shed light on how feedback (as a form of social interaction) can be used by web-enabled crowdsourcing platforms to support and stimulate idea development, in that light contributing to the growing body of crowdsourcing studies (Adamczyck et al., 2011; Füller et al., 2014; Marion et al., 2014; Majchrzak & Malhotra, 2014; 2016; Beretta & Magnusson, 2017; Hütter et al., 2017; Piezunka & Dahlander, 2018; Porter et al., 2020) who investigate the use and inner-dynamics of web-enabled idea contests. As recently shown in extant studies, feedback can evoke increased participation from ideators (Füller et al., 2014; Piezunka & Dahlander, 2018; Zhu et al., 2018), it can serve as an effective communication tool to share knowledge (Majchrzak & Malhotra, 2016) and has the potential to enrich ideas (Porter et al., 2020). We add a theoretical typology that can be used to distinguish feedback interactions and we showcase how internal organizational characteristics can affect the provision and reception of feedback on web-enabled idea contests platforms.

## 2.6.2 Managerial Contributions

From a managerial perspective, our findings offer important insights & implications for practice. Although organizations increasingly organize idea contests to crowdsource ideas from their employees (Deichmann & Van den Ende, 2014; Majchrzak & Malhotra, 2016; Piezunka & Dahlander, 2018), few studies focus on idea development. Concretely, we make a case for the innovation front end process to be set up in a way to give sufficient time for ideas to become iteratively challenged and refined, e.g. to give them time to develop. Our results show that challenging ideas in a continuous feedback process, particularly through the form of communicating directive feedback, can significantly improve the progression of ideas throughout the idea contest process, in function of a heightened idea quality as evaluated at each gate. This finding underscores the importance of allowing ideas to evolve and to not make a final selection immediately from the very idea submissions in a one-stage idea contest. In line with the suggestion of Terwiesch & Ulrich (2009), a stepwise evaluation of ideas is likely to improve the accuracy of the selection of the most fruitful ideas.

Second, our study demonstrates under which conditions feedback is most effective in progressing the development of ideas in the front end process. We do so by categorizing feedback as directive and motivational– showing that directive feedback consistently is the most effective in inducing idea development, regardless of who sends it. This finding stresses the importance for organizational members of any hierarchical rank to voice their knowledge and expertise, in the form of directive feedback, to their peers, subordinates and supervisors in the context of developing high-quality ideas. This implication extends to the organizers in charge of organizing (web-enabled) idea contests. Our findings suggest that in order to establish better developed ideas, the set-up of the idea contest platform should be designed to encourage and support the communication of directive feedback from anyone in the organization in order to support development and enrichment of ideas.

A final managerial implication relates to repetition of feedback. Our results hint at a positive effect of feedback similarity – which implies that (partially) repeating feedback can strengthen the likelihood that feedback will be taken up during the development of ideas. This seems to contradict the notion 'that feedback should not be repeated if it has already been mentioned once.' As a matter of fact, repeating certain feedback can strengthen the feedback message and can be interpreted as an indicator that the feedback should be addressed as multiple people point it out. Idea contest organizers could therefore allow feedback providers to repeat previously given feedback if this feedback is considered important.

## 2.6.3 Limitations

Several limitations suggest caution in the interpretation of our findings. First, we base ourselves on data of a single firm, which limits the generalizability of our findings. Yet, there are many contexts that resemble the firm's organizational structure, functions and developmental processes, where preliminary ideas are refined in iterative steps, before considerable resources are invested in the implementation of these ideas. Second, we do not have absolute scores of idea quality during the different stages of the idea contests. Instead, we rely on a relative ranking of ideas in terms of idea quality by considering how far an idea proceeds during an idea contest. Third, although we make use of a long list of control variables and additional robustness tests, we cannot fully rule out endogeneity

concerns on feedback. Fourth, while we rely on multiple arguments to build up our hypotheses regarding the hierarchical effect of directive and motivational feedback, our data does not allow us to conclude which mechanisms are exactly driving our empirical findings. Fifth, since multiple ideas receive zero or few feedback comments, we are limited in our investigation of the role of feedback similarity. A closer investigation of the role of feedback similarity on idea development is therefore regarded as a fruitful avenue for further research. Another interesting route for further research involves a comparison of the effects of feedback given early and late in the idea contests. This analysis could not be done in this paper because most of the feedback was given at the beginning of the idea contest. Finally, further research can complement our work by examining whether different types of feedback impact differently on different characteristics of ideas such as “idea comprehensiveness” versus “idea specialization.”

# Chapter 3

# The Colour of Hierarchy: How Hierarchical Endorsements affect Idea Selection during the Idea Contest

[vii]

## 3.1 Introduction

It is widely understood that social context shapes creative outcomes, and that organizational structure can affect the journey from idea conception to completion within organizations (Perry-Smith, 2006; Kijkuit & Van den Ende, 2007; Van der Vegt et al., 2010, Tzabbar & Vestal, 2015). Significant attention has been directed at the link between hierarchical structure of organizations and cognition, innovation and capability development (Gavetti, 2005; Van der Vegt et al., 2010; Reitzig & Maciejovsky, 2015; Keum & See, 2017). Yet, although hierarchy is an inherent element of any organisation and has been a longstanding interest of organizational scholars (Magee & Galinsky, 2008; Anderson & Brown, 2010), how organizational members with differential hierarchical positions influence each other's attitudes and behaviour in the idea creation process remains largely unexplained (Powell, et al., 2011; Keum & See, 2017). This is partly due to the difficulty of gaining access to real-

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life behavioural data or observing and documenting the role of hierarchy as it unfolds in the creative processes (Gavetti et al., 2012). Most organizational studies on the role of hierarchy on innovation have centred on the presence of hierarchy within teams (LePine et al., 1997; Van der Vegt et al., 2010; Perry-Smith & Coff, 2011; Tzabbar & Vestal, Aime et al., 2014; Frauendorfer et al., 2015; Greer et al., 2018) or linking hierarchical steepness in firm's organizational structure to innovation output (Cardinal et al., 2001; Jansen et al., 2006). In contrast, few studies have looked into how individual's perceptions about the value of innovative ideas can be shaped by other organizational members who hold differential hierarchical positions. Keum and See (2017) demonstrated that hierarchy can affect the selection of ideas through diminishing the tendency to self-select own ideas, when individuals are in close proximity to high-hierarchical members. When deciding what ideas to take forward and which to abandon, the question of whether individuals are influenced differently by endorsements of ideas given by other members within the organizational hierarchy has not been addressed.

To explore this question, we conducted a natural field experiment to examine how idea selection decisions - the decision to select an idea for further elaboration or to not - is affected by endorsements given by members of certain organizational hierarchical ranks, a behavioural process we term *hierarchical endorsement*. Furthermore, we explore whether the hierarchical source of endorsement is liable to affirm individual's initial judgement about selecting an idea (hold decisions) or whether it changes the initial judgement, resulting in selecting previously unconsidered ideas (switch decision). We are interested here in drawing inferences on how the position in the organisational hierarchy of an endorser can affect the idea creation process, not in comparing different hierarchical structures. Hierarchy, defined as the formal rank order of members in the organisational structure, is therefore approached as a function of the individual's formal level of power and status (Brass & Burkhardt, 1993; Ibarra, 1993; Magee & Galinsky, 2008; Anderson & Brown, 2010).

We focus on the effect of hierarchical endorsements during the earliest stages of an idea journey, the idea generation phase (Perry-Smith, 2006; Kijkuit & Van den Ende, 2007; Garud et al., 2013; van den Ende et al., 2015; Keum & See, 2017). The idea generation phase involves the conception of ideas, which can be realised through a wide range of, typically unconscious and unformalized idea generation techniques and processes (Cheng & Van de Ven, 1996), such as variation-inducing thought processes

(Campbell, 1960), associative thought (Mednick, 1962), or the recombination and assembly of knowledge and ideas (Granovetter, 1977; Burt, 2004). But the idea generation phase also includes the selection about which ideas are deemed potentially useful and novel (Amabile, 1983; Woodman et al., 1993; Perry-Smith & Mannucci, 2017). A central decision during idea generation therefore demands determining what ideas to select for elaboration and introduction into the organization development procedure – and, conversely what ideas to reject (Van de Ven, 1983; Boudreau et al., 2016; Piezunka & Dahlander, 2019). In this decision-making process, idea creators typically interact informally with others, seeking out advice, counsel and feedback on ideas before investing more time and resources in their development (Van de Ven, 1983; Bonaccio & Dalal, 2006). Interacting with others can support the idea creator in forming their judgement about the merit of the idea as well as providing access to resources to help elaborate and extend the idea (Heath & Gonzalez, 1995; Schotter, 2003). As such, the social aspects of idea creation can provide a window into how hierarchical endorsements influence the initial stages of the idea journey, before the formal procedures and routines of the organization take hold.

To test the effect of hierarchical endorsements on idea selection decisions, we conducted a natural field experiment at a major European university organisation during an extensive ideation event, where education program committees comprising professors, staff and student representatives generated and selected ideas that would further be used to ameliorate or reinvent the education programs of the university. During the ideation field experiment, we manipulated information about the hierarchical rank (high or low hierarchy) of endorsements to participants. After randomly assigning participants to different teams, participants in the treatment group were given colour-coded stickers during endorsement voting on ideas developed by other teams, whereas in the control group all participants were given the same colour stickers during their voting. The colour code of the stickers in the treatment group reflected the hierarchical rank of the organizational members and was known to participants in the treatment group. Apart from the colour of stickers provided to the treatment group, all other aspects of the ideation event were set up identical across the two groups. The groups were assigned to the treatment and control through a blocked randomization procedure. A pre-test, post-test and manipulation check were all structurally integrated into the idea generation process. The experimental

research involves the person-idea level as unit of analysis (n = 2.843 observations) and sought to assess whether the presence of information on the hierarchy of endorsements of ideas would shape participants decisions to select an idea generated.

Drawing on the interdisciplinary research on organizational hierarchy, we take a granular approach to disentangle how endorsements given by organizational members with high hierarchical positions can affect idea selection decisions in the creative process (Sheremata, 2000; Garud et al., 2013; Keum & See, 2017). We argue that those ideas with a higher share of hierarchical endorsements will be favoured by participants, due to the perception of higher competence or expert intuition of senior members placed higher in the organizational hierarchy (Simon, 1987; Druckman, 2001), the ascription of the higher likelihood of idea implementation with senior support (Harvey & Fischer, 1997) and/or because of possible acts of deference to please those in high hierarchical positions (Kipnis, 1983; Joshi & Knight, 2015). The field experiment shows support for our main conjecture, as we find that the effect of hierarchical endorsement is present in the treatment group but not in the control group. Additionally, we explore different decision mechanisms at play when considering the selection of ideas in the face of hierarchical endorsement. We find that hierarchical endorsements mainly reinforce the initial quality perceptions of idea creators, rather than that they shift the selection towards ideas that idea creators did not consider previously. Finally, we find no all-embracing effect of hierarchical endorsement. A more detailed investigation demonstrates that hierarchical endorsement is noticeably present only among those individuals high in the hierarchy, while it matters little or not for those in lower positions.

The contribution of this study to the literature is three-fold. First, we argue and demonstrate that hierarchical endorsements shape choices even at the early stages of the idea journey and that such endorsements may influence perceptions of idea quality among those involved in ideation processes. Second, we test how hierarchical endorsement affect the decision-making of organizational actors by distinguishing hold decisions (confirming initial judgement about selecting an idea) and shift decisions (entertaining previously unconsidered ideas) in light of endorsements received. Third, by designing and undertaking a novel field experiment that relies on a seemingly subtle, yet potent treatment, we test how hierarchical endorsements shape idea creation for different actors within the hierarchy of authority in organizations. In probing our results and ex-post analysis, we demonstrate hierarchical endorsements

speak most strongly to those already positioned at a high level in the organizational hierarchy but have little call on those in lower hierarchical positions.

# 3.2 Theoretical background

## 3.2.1 Organizational structure and hierarchy

While organizations in today's society are becoming increasingly flatter, with decentralized structures, more organic processes and lean management approaches (Ahuja & Carley, 1999; Zhou, 2013), scholars point out that the pervasiveness of hierarchies in organizational life remains persistent to this day (Nadler & Tushman, 1997). The vertical structure of organizations in today's competitive landscape do indeed resemble less the stylized image of pyramid hierarchical organization, where rigid vertical information and communication infrastructures were used to process and send up information to the upper-level management for decision-making, and relaying the decision from the top back down in a cascading manner (March and Simon, 1958; Williamson, 1967; Gavetti, 2005). Instead, scholars recognize that organizations nowadays are structured more as complex social structures or networks which consist of group-based hierarchical ranks and cascading relations (Diefenback & Silince, 2011; Bunderson et al., 2016).

The theorem that organizational structure has a direct effect on the decision-making, behaviour and actions of organizational actors has deep roots in the organizational and management literature (Emerson, 1962; Blau, 1964; Cyert & March 1963; Bunderson et al., 2016). Organizational hierarchy, as a fundamental cornerstone of organizational structure, is traditionally defined as the asymmetrical centralization, formalization and distribution of functional roles, authority and resources in an organization (Barnard, 1938; Weber, 1947; Vroom, 1969; Katz & Kahn, 1978; Katz & Tushman, 1979; Mintzberg, 1983; Cohen, 2007; Gavetti, Levinthal & Ocasio, 2007). The position of an organizational actor in the organizational hierarchy of a firm is acknowledged to reflect their respective power and status they hold (Emerson, 1962; Fiske, 1993; Anderson et al., 2006; Magee & Galinsky, 2008). Power and status are therefore presented as two important, yet distinct bases for hierarchical differentiation between various ranks in the organization, where power is referred to as the authority or influence an actor has over valued resources (Magee & Galinsky, 2008), while status refers to the respect an actor

has in the eyes of others, e.g. the perception of competence (Anderson et al., 2006). As such, the hierarchical structure of an organization represents the asymmetrically disparity/distribution of power and status among (groups of) organizational members (Emerson, 1962; Fiske, 1993; Anderson et al., 2006; Magee & Galinsky, 2008).

### 3.2.2 Hierarchy and innovation

The hierarchical structure of an organization has repeatedly been linked to cognition (Gavetti, 2005; Van der Vegt et al., 2010), capability development (Reitzig & Maciejovsky, 2015) and innovation (Damanpour & Aravind, 2012; Keum & See, 2017). A culminating stream of literature has concentrated on investigating the degree of hierarchy in organizations, referring to the hierarchical distance between groups or layers of organizational actors, and linked it with innovation output and performance (Cardinal et al., 2001; Jansen et al., 2006; Davis et al., 2009). A central, over-arching question in this stream of literature posits whether stronger/steeper hierarchical structures are detrimental or beneficial for organization's processes, activities and innovation performance (Burns & Stalker, 1961; Anderson & Brown, 2010; Csaszar, 2013).

Originally, hierarchical structures were advocated to reduce complexity by dividing labour, resources and responsibility, enabling formal communication and information lines, as well as making organizational decision-making easier by centralizing decision-making at the top of the organization (Burns & Stalker, 1961; Garud, Tuertscher, Van de Ven, 2013). While some studies support the argument that hierarchical organizational structures can be beneficial for creativity and innovation through facilitating coordination, efficient communication, information sharing and by mitigating conflicts (Siegel & Hambrick, 2005; Mihm et al., 2010; Halevy, Galinsky & Murnighan, 2011; Huang & Cummings, 2011), other studies counter-argue that more centralized hierarchical structures can undermine creativity and innovation due to more bureaucratic rules, procedures and control to the point that it constrains creativity-stimulating activities and behaviour (Brooks, 1994; Bunderson, 2003; Siegel & Hambrick, 2005; Anderson & Brown, 2010; Rentsch & Small et al., 2010; Ronay et al., 2012; Bunderson et al., 2016). This line of research suggests that employees in more centralized hierarchical organizations feel less responsible for seeking out new ideas or opportunities, are less inclined to voice

new ideas as they want to avoid mistakes or lose face (Burgelman & Sayles, 1986; Jansen et al., 2006; Morrison & Miliken, 2000; Reitzig & Maciejovsky, 2015; Keum & See, 2017).

At this point, the empirical evidence whether (steeper) hierarchical organizational structures are beneficial or undermining for creativity and innovation is inconclusive, as performance has been shown to turn both ways (Damanpour & Arvind, 2012). On the one hand stronger hierarchy in organizations (more centralization and formalization) have been associated with higher innovation performance (Cardinal, 2001), while other studies link stronger hierarchy to negative innovation performance (Jansen et al., 2006). To untangle the complex relation between hierarchical structure and innovation, scholars have pointed out that a more granular approach to studying the impact of organizational hierarchy on the multi-phased innovation process is required (Sheretmata, 2000; Garud et al., 2013; Keum & See, 2017).

As innovation is recognized as being a multi-phased social process where people interact, collaborate and influence one another when generating, selecting and implementing ideas (Perry-Smith, 2006; Kijkuit & Van den Ende, 2007; Tzabbar & Vestal, 2015), firms have turned more often to relying on teams to generate and develop ideas into innovations (Bunderson, 2003; Van der Vegt & Bunderson, 2005; Halevy et al., 2011; Huang & Cummings, 2011; Ronay et al., 2012). Significant attention in the small group and team literature has centred on investigating how diversity in terms of (functional and demographic) characteristics of team members can be conduits for creative team processes, learning behaviour and establishing more creative outcomes (Bunderson, 2003; Van der Vegt & Bunderson, 2005; Halevy et al., 2011; Ronay et al., 2012). While diversity of team members is generally encouraged, at this point, there is no consensus whether integrating organizational actors with differential hierarchical ranks in teams is beneficial or hampering for creativity or innovation (Keum & See, 2017). Yet scholars have recognized that having members from differential hierarchical ranks in teams can have disproportional impact on team's processes and decision-making (Bunderson, 2003; Halevy et al., 2011; Ronay et al., 2012). Buzaglo & Wheelan (1999) observed that high-hierarchy ranking members dominated group discussions for more than 75 percent of the time. In an experimental set-up, Anderson & Kilduff (2009) uncovered that the first proposals or ideas generated during team-based idea generation sessions, which interestingly enough are also often the most likely to be selected,

were three times more likely to be suggested by high-hierarchy ranking persons. Keum and See (2017) demonstrated that actors with lower hierarchical positions are less likely to voice ideas in the near presence of members who hold high hierarchical positions, therefore diminishing the number of generated ideas. At the same time, they show that organizational actors are less likely to self-select their own generated ideas when they are in the presence of high hierarchy actors.

As the mere presence of high hierarchical actors can evoke such an effect on idea generation and selection, we ponder what the effect could be when organizational actors with differential positions in the organizational hierarchy openly communicate their opinion or valuation about ideas. Building further on this notion, we are interested to understand how the idea selection of individual actor's are affected when interacting during the idea creation process with other organizational actors with varying positions in the organizational hierarchy.

### 3.2.3 Hierarchical endorsements and idea selection

The evaluation and selection of ideas is considered an essential part of the search and exploration processes of organizations (Mintzberg et al., 1976; Mihm et al., 2011; Laureiro-Martinez, 2014). Selecting what ideas to take forward and which to abandon is not a straight-forward task because of the high uncertainty surrounding the development and eventual outcome of each idea (March, 2006; Kijkuit & Van den Ende, 2007; Lohrke et al., 2010). Due to this high level of uncertainty, decision-makers will find it difficult to optimize their decisions on a pure rational basis (Simon, 1955; Frederickson, 1984) and therefore likely seek to reduce uncertainty by acquiring more information from others in the organization (Gavetti & Levinthal 2000; Gavetti 2005; Knudsen & Levinthal, 2007).

For an organisation to deem an idea valuable and adopt it, it has been argued that the idea should gain social approval and acceptance from its organizational members (Simonton, 1989; Kijkuit & Van den Ende, 2007). Organizational research has pointed out that organizational actors, over time, develop a consensus of what an acceptable or valuable idea entails, as they have been socialized to the organizational context and routines and therefore operate on the basis of similar mental schema, cognitive frames and categories (March & Simon, 1958; Nelson & Winter, 1982; Frederickson, 1986). Yet, even within the boundaries of the organization, organizational members are shown to hold

dispersed knowledge, expertise, information and values (Nelson & Winter, 1982; Frederickson, 1986; Shane, 2000; Becker, 2001), which can lead to diverse interpretations of value regarding each opportunity or idea and its fit with the organization (Daft & Lengel, 1986; Drejer et al., 2004; Bergendahl & Magnusson, 2015). Different members within the organization can identify different opportunities or ideas that may generate value for the organizations to which they belong.

Therefore, when tasked with evaluating and selecting ideas, organizational decision-makers are argued to greatly benefit from interacting with other members in the organizations, as this can help them to find out whether others endorse or disapprove of the idea (Thomas-Hunt et al., 2003; Perry-Smith, 2006; Kijkuit & Van den Ende, 2007; Tzabbar & Vestal, 2015; Majchrzak & Malhotra, 2016). Endorsements, defined as cues of positive valuation of an idea (McClean et al., 2021) are a prominent way to communicate to others that an idea is deemed valuable or promising and therefore merited to take forward in the innovation process (Ford et al., 2008; Burris, 2012; Perry-Smith & Manucci, 2017).

Whether people adhere to the endorsements of others in the organization, however, is no sure thing and is largely dependent on the availability, visibility and dispersion of endorsements, and the value assigned to each endorsement (Soll & Larrick, 2009; Fini et al., 2018). While we generally expect individual actors to generally favour and select ideas that receive endorsements from others in the organization (Simonton, 1989; Kijkuit & Van den Ende, 2007), we are interested at uncovering whether more value is assigned to endorsements given by members with high positions in the organizational hierarchy, and whether this is liable to influence the evaluation and selection of ideas. We build up our argumentation in favour of high-hierarchy endorsements based on three reasons.

First, individuals in high hierarchical positions are often perceived to be highly competent. Scholars have pointed out that members positioned at the upmost part of the organization are typically perceived as being more competent, as they have accumulated more knowledge, more expertise or relevant skills (Davis & Moore, 1945; Eibl-Eibesfeldt, 1989). Such knowledge may be related to firm-specific processes, strategies and practices, as well as wider general-industry knowledge (Campbell, et al., 2012). Employees who reach positions or ranks high up the hierarchy typically had to display certain skills, expertise and competences to qualify for and maintain the position at the higher echelon in the hierarchical structure (Ashforth & Schinoff, 2016). As a consequence, they tend to be perceived by

others as being more competent and are therefore reckoned to make better informed decisions (Davis & Moore, 1945; Eibl-Eibesfeldt, 1989). Those individuals who rise to the top of the organization will also have faced significant selection and performance hurdles to obtain their elevated positions. As a result, there will be an assumption among others in the organization that these individuals have insights and knowledge that allow them to make better decisions about the future needs and requirements of the organization than those in lower hierarchical positions. Additionally, intra-group studies have demonstrated that members tend to give more weight to individuals who exhibit superior competence, expertise and social and leadership skills (Lord, 1985; Van der Vugt, 2006; Anderson & Brown, 2010) and that organizational actors generally have a clear consensus of the power and status levels that a certain hierarchical rank or position entails (Tannenbaum, 1968; Anderson, Ames et al., 2008; Anderson et al., 2006).

Second, given that most ideas are rejected by the organization, especially during the fuzzy idea evaluation and selection stage, individuals may perceive that an endorsement from those individuals in a high hierarchical position is a signal that these ideas may gain traction and eventually be implemented. Those in high hierarchical positions typically control (relatively more) organizational resources and attention (Ocasio, 1997). If senior members of the organization endorse an idea, then this idea is more likely to gain early access to critical resources to develop it into a more robust idea, helping to reduce the uncertainty associated with the idea itself. In addition, senior members of the hierarchy are often key decision-makers in the subsequent and more formal phases of idea selection and development (Cooper, 1990). As such, their support for early stage ideas may attest to their future support when these ideas are considered at more formal organizational stage gate product development processes (Cooper, 1990). Therefore, even at the earliest stages of the idea creation, individuals involved in the idea creation process may filter endorsements, assigning higher credence to those ideas that are endorsed by those in high hierarchical positions.

Thirdly, extant research has pointed out that deference, outlined as “yielding to one another’s opinions, beliefs or decisions” (Anderson et al., 2012; Joshi & Knight, 2015) is not uncommon in organizational decision-making processes and can happen regardless whether they believe the other person is right. Deference to another person’s decision, advice or opinion has been shown to be

particularly more likely to occur when that person holds superior power and status (Berger et al., 1980, 2006; Bunderson, 2003; Fragale et al., 2012; Joshi & Knight, 2015). While deference towards high-hierarchy members of the organization can occur because they are attributed a 'competence or expertise advantage' (Joshi & Knight, 2015), which relates back to our first argument, organizational members have also been shown to engage in deference to speed up socialization in the organization (Bonaccio & Dallal, 2006) or to influence themselves upward (Kipnis et al., 1984, 1988; Farmer et al., 1997).

### 3.2.4 How hierarchical endorsements affect idea selection decision-making

The selection of ideas has been shown not always to consist of one-off choices in practice, but rather of a process of divergence and convergence (Langley et al., 1995), as individual decision-makers tend to adapt their initial judgement about a decision in light of new information uncovered (Laroche, 1995; Payne et al., 1993; Kijkuit & Van den Ende, 2007; Klingebiel & De Meyer, 2013). [8] To amplify our examination of how hierarchical endorsements affect idea selection decisions, we take a step further in our study by exploring how idea evaluators adjust their selection of ideas in function of hierarchical endorsements. In particular, we aim to examine whether hierarchical endorsements mainly result in affirming initial judgements about selecting an idea or not (labelled as *hold decision*), or whether they result in adjusting the initial judgement to include previously unconsidered ideas (labelled as *shift decision*) or whether the endorsements are simply ignored or discounted.

In spite of the prominent assumption in the organizational decision-making literature that organizational actors can be adaptative in their decision-making (Cyert & March, 1992; Payne et al., 1993; Langley et al., 1995; Laroche, 1995), surprisingly little is known in the extant idea selection literature regarding how individual organizational actors adjust their initial judgements about the potential of an idea in the presence of new information (Langley et al., 1995; Klingebiel & De Meyer, 2013; McClean et al., 2021). Extensive research, however, from the cognitive and behavioural

[8] The idea of convergence is especially apparent in new product development processes, where it has become an general principle to reduce uncertainty sufficiently so that an idea meets the imposed selection criteria in the stage-gate process (Moenaert et al., 1995; Kim & Wilemon, 2002; Kijkuit & Van den Ende, 2007).

psychology (Tversky & Kahneman, 1974; Einhorn & Hogarth, 1981; Kahneman, 2003), political (Leduc, 2002; Geers et al., 2017), forecasting (Clemen et al., 1989; Armstrong, 2001), and consumer and marketing (Hulbert, 1981; Klein & Yadav, 1989; Wierenga, 2011) literatures has shed light on how decisions are adapted when faced with new information or signals provided by other people. Essentially, these strands of literature concur that new information (voiced or signalled in the form of opinions, advice, endorsements, feedback, behaviour, etc.) can either align with the initial judgement of the decision maker, thus confirming it, or it can contrast or deviate from it.

Whether people adhere to the information, endorsements or advice of others has been shown to be largely dependent on the task at hand, the characteristics and interrelations between the decision-maker and the other person, and on the context wherein decision-making takes place (Bonaccio & Dalal, 2006; See et al., 2011; Fini et al., 2018). Overall, people have been shown to have a general systematic preference for information that supports or confirms their initial judgement, as this conserves their self-esteem and is easier to process mentally (Gavetti & Rivkin, 2005; Fischer, 2011; Shepherd et al., 2012) – therefore making it more likely that idea evaluators will adhere to endorsements that support their initial judgement about an idea (hold decision) compared to endorsements that do not align with their initial judgement (shift decision).

When the information or advice of others deviates from the initial judgement, people have been shown to reside to satisfying their decision-making outcome (Simon, 1955; Yaniv & Milyavsky, 2007) by following a 'take-the-best' judgement strategy, which essentially boils down to deciding whether the new information or advice is considered better compared to the own initial judgement (Soll & Larrick, 2009). When receiving endorsements that point out previously unconsidered ideas, idea evaluators might decide to follow the endorsement and therefore select the endorsed idea, especially if they perceive that the endorser might have a good notion of the potential value of the idea (Lord, 1985; Van der Vugt, 2006; Anderson & Brown, 2010). This may be the case when endorsers occupy high organizational ranks. We question whether the hierarchical position of the endorser might increase idea evaluator's tendency to adjust their idea selection decision, by switching the initial selected ideas with previously not-considered ideas (shift decisions) that get endorsed.

Nevertheless, when endorsements deviate from the initially considered ideas to be selected, the endorsement might simply be ignored or discounted. A prominent finding of the advice-taking literature shows that people do not shy away from simply discounting or rejecting advice, opinions or new information (Yaniv & Kleinberger, 2000; Bonaccio & Dalal, 2006; Yaniv & Milyavsky, 2007) as they tend to anchor their decision on their initial judgement about that decision (Tversky & Kahneman, 1974) and because of egocentric bias, believing their own assumptions underlying a certain decision are superior to those of others (See et al., 2011; Tost et al., 2014).

# 3.3 The Field Experiment

## 3.3.1 Setting and context

Our natural field experiment involves professors, professional university staff members and student representatives from a major European university organization involved in an idea creation process. Within the institution, professors, professional staff and student representatives are collectively responsible for development and delivery of a wide range of education programs. These programs are delivered at various campuses across the country. Each separate education program has an education committee made out of professors, professional staff and student representatives.

At the end of October 2019, all members of the education committees of the Faculty of Business and Economics (n=168) were invited to participate in a strategic idea generation and elaboration day to improve the education programs of the Faculty. This was the first time an idea creation exercise was organised with all the education committees of the Faculty together. A secondary invitation was sent out at the start of November as a reminder to subscribe and attend the day. The invitation was structured so that participants would a priori know the objective of the day and the overall agenda, although they were kept in the dark of the detailed procedure of the idea generation and elaboration process. The invitations generated 80 attendees. However, five members did not show up at the event, two persons left before the idea generation started, and one member showed up without communicating his attendance a priori. In response, one team was disbanded, and members were added to other teams of their education committee. The workshop took place during a normal working day during the Autumn term and it took nine research coordinators to fully oversee and manage the ideation day and the

experimented it encapsulated. Exhibit 1 in the appendix at the end of this chapter provides an exhaustive overview of the schedule and flow of the field experiment. At the start of the day, all participants were gathered at a central university building and welcomed with coffee, tea and biscuits. The program began with an introduction and a disclosure of the objective of the day, which was chaired and presented by the Vice-Dean of Education of the Faculty. The five focal topics on which ideas were going to be generated and elaborated upon during the day were briefed in detail to the participants. The focal topics, branded as 'idea challenges' in the format of 'how-might-we-questions', involve the re-inventing and improving of the faculty's education programs aimed at creating a more research-driven, international and better career-preparing education. The challenges were formulated as follows: 1) what would the ideal education program look like, 2) how can we stimulate information and research skill development throughout the program, 3) how might we optimally work on the development of global competences so that all graduates are internationally competent, 4) how might we optimally work on the development of professional skills and 5) how might reinvent the educational approach to suit the ambitions of the education program?

Each education committee was randomly assigned to one of two university buildings for the experiment, building A or building B. After the welcome and introduction briefing, the group was split up and directed towards either building A or B, both close by the central building. The walking distance for each location was approximately 400 metres and the walk on foot took approximately five to six minutes. All the education committees (n = 9) were a priori split up into smaller teams (n = 18) of four members, based on the list of attendees. Through the application of a randomized block design, participants were divided into teams or blocks. We split the subjects up into different teams in function of the educational program they are responsible for, as these are the organizational members of the university with whom they frequently work together. The reason we chose to work with a block design instead of complete randomization of participants is to ensure that we mirror the natural way of working for the subjects for external validity. The teams of participants of a certain education committee were then randomly assigned to the treatment or control group.

At precisely 10:00, at each university building, the education committee members were welcomed and handed out, per person, a block of post-it's (n=40) and a standard sheet of stickers (n=60). At the

back of each post-it, a letter was stamped by the research team using a set of alphabet wood stamps and several ink pads. The letter was put on the post-it's so that the research team could ex-post identify who generated the idea. In total more than four thousand post-it's were stamped like this. In a similar manner, a letter was placed on each sticker to reconstruct the voting pattern of participants, resulting in about six thousand stamped stickers.

Each participant was informed by the welcoming committee that their post-it block and sticker sheet was specifically to be used by the participant himself/herself, so that the brainstorm output could be collected and recreated ex-post by the organizers. Each post-it note has the standard canary yellow colour. The control group (Building A) received stickers in a standard colour (drawn at random from three colours, resulting in the colour grass green). The treatment group (Building B) also received the standard yellow-coloured post-it notes. Differently however, the treatment group was assigned stickers in colours that represented their function in the educational committee, which were randomly drawn from cobalt blue, grass green and sunlight yellow. We ran a randomization procedure via the RANDOM-excel function once, resulting in the assignment of the three colours, eventually being blue given to professors, green to staff and yellow to student representatives. When handing over the material, the welcoming committee at Building B stressed to each participant that the colour of the stickers (blue, green, yellow) they received was handed to them because they were a professor, a professional staff member or a student representative. This was done with the intention to draw attention to the colours of the stickers and to accentuate their connection to the (hierarchical) role of the educational committee member. Furthermore, each name tag was underlined with the same colour as the stickers they received.

After the distribution of the materials, each team was assigned and guided to a specific breakout session room. All the breakout session rooms were equipped with five brainstorm posters placed on the walls with magnets beforehand. The posters are constructed from two A3 papers and were intended to have sufficient space for approximately a maximum of 30-40 post-it notes. Each idea poster had a standard format, branding the respective idea challenge as a title on top. The rooms itself provided a venue suitable for walking around and presenting ideas on the posters. Each poster was placed in the same order in each room going from left to right when entering. Both buildings are similar as they have

a modern interior design and an open feeling thanks to the many large windows in place. In building A, the teams were seated in six breakout rooms, spread over two floors. In building B, the teams were seated in thirteen breakout rooms, spread over three floors. Each floor had one dedicated research coordinator present to manage the timing and flow of the ideation process. Additionally, there was a lead research coordinator present at each building, with the responsibility to follow-up the floor coordinators, to ensure alignment of timing across the floors and to jump in in case of irregularities that might occur. Communication was also closely monitored by the two lead coordinators in each building to maintain the same flow and timing across the two buildings.

The breakout sessions took place from 10:15 to 13:00 and were split into three phases: 1) idea generation, 2) endorsement sticker rounds and 3) idea selection. No breaks were structurally placed into the process. Participants could obtain refreshments from a coffee table in the middle of the floor space. When entering the breakout room between 10:05 and 10:15, each team found a document that they needed to read and fill in. In this document (exhibit 2), they were asked to fill in the names of all team members present in the room, which we used as a secondary attendance check. Additionally, the document listed a number of ideation tips and instructions. At 10:15, the floor coordinators gave the signal to the teams to start the idea generation phase.

Each group was instructed to ideate for fifteen minutes on each challenge, in a prescribed order. After every fifteen minutes, the floor coordinators entered the room and mentioned that it was time to move on to the next idea challenge. At the end of the idea generation phase, at 11:40 to be precise, each floor coordinator distributed a paper document on which each participant individually had to rank the best six ideas that their group had generated and that would best meet/satisfy the idea challenges. Once this document was filled in, the floor coordinators assembled them and informed the team about the procedure of the next phase.

The second phase was the sticker voting round. Each group was instructed by the floor coordinator to rotate to another breakout room and to vote on ideas that they personally found the best ideas in response to the idea challenges, using the stickers that were handed out before. Each group rotated simultaneously to two breakout rooms. The rotation was predetermined beforehand to ensure that no more than one group would be in each breakout room. In each breakout room, the participants had ten

minutes to read the generated ideas and place their stickers. Each participant was instructed to place maximum one sticker per idea. After the two voting rounds, at 12:15, the participants returned to their own breakout room for the third phase of the ideation exercise. Figure 4 & 5 provide a visualization of the poster with hypothetical post-its and endorsements.

The third phase involved the final selection of ideas. As participants returned to their breakout rooms, the floor coordinators handed out a similar idea selection document as before, on which the participants were asked - now that they had received endorsements via the stickers from the other teams on the ideas that were generated by their group – to individually rank the ideas that would best meet/satisfy the idea challenges according to them. Figure 4 & 5 provides two examples of idea posters that received endorsements with stickers, one for the treatment and one for the control group.

Whereas in previous studies of adaptive decision-making, the period of time to make the initial judgement is expected to vary with the time for the final decision (Klingebiel & De Meyer, 2013), we keep the decision time duration the same for the initial judgement and the final decision. Once each participant had ranked the six ideas, the floor coordinators collected the documents and handed out a final paper survey. This final document contained a post-treatment test and additionally informed each participant about the intent of the experiment and asked for approval to use their data conform privacy regulations. Appendix 3 presents the postsurvey questionnaire.

Through this procedure, we integrated a randomized block experimental design with a pre-test and post-test. During the day, the research team collected three written documents in total from the participants. The first document we collected is the idea ranking list before endorsement, which is gathered from the participants as a pre-test. The second document, the final idea ranking list, is collected from the participants after the endorsements and contains the post-test idea selection. Eventually, at the end of the procedure, a paper survey document was collected from the participants before they departed for lunch (see exhibit 3).

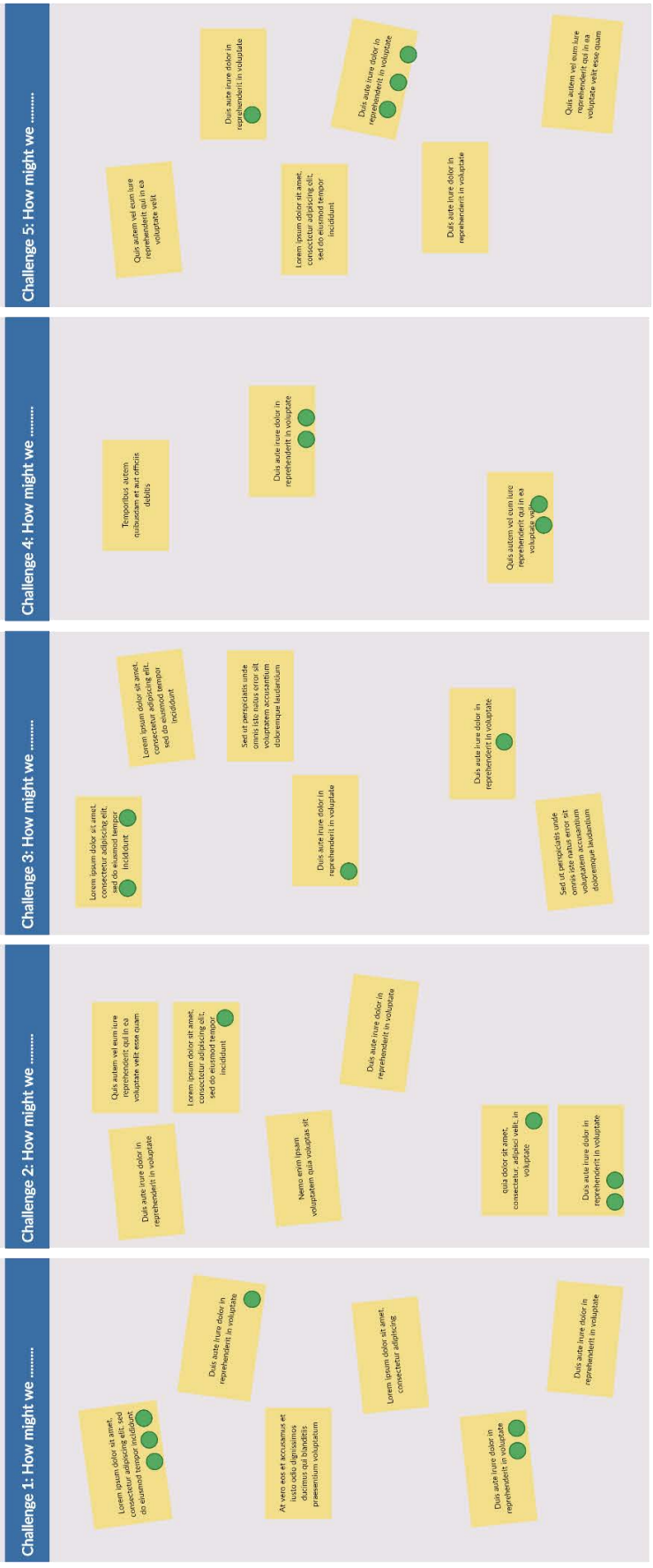
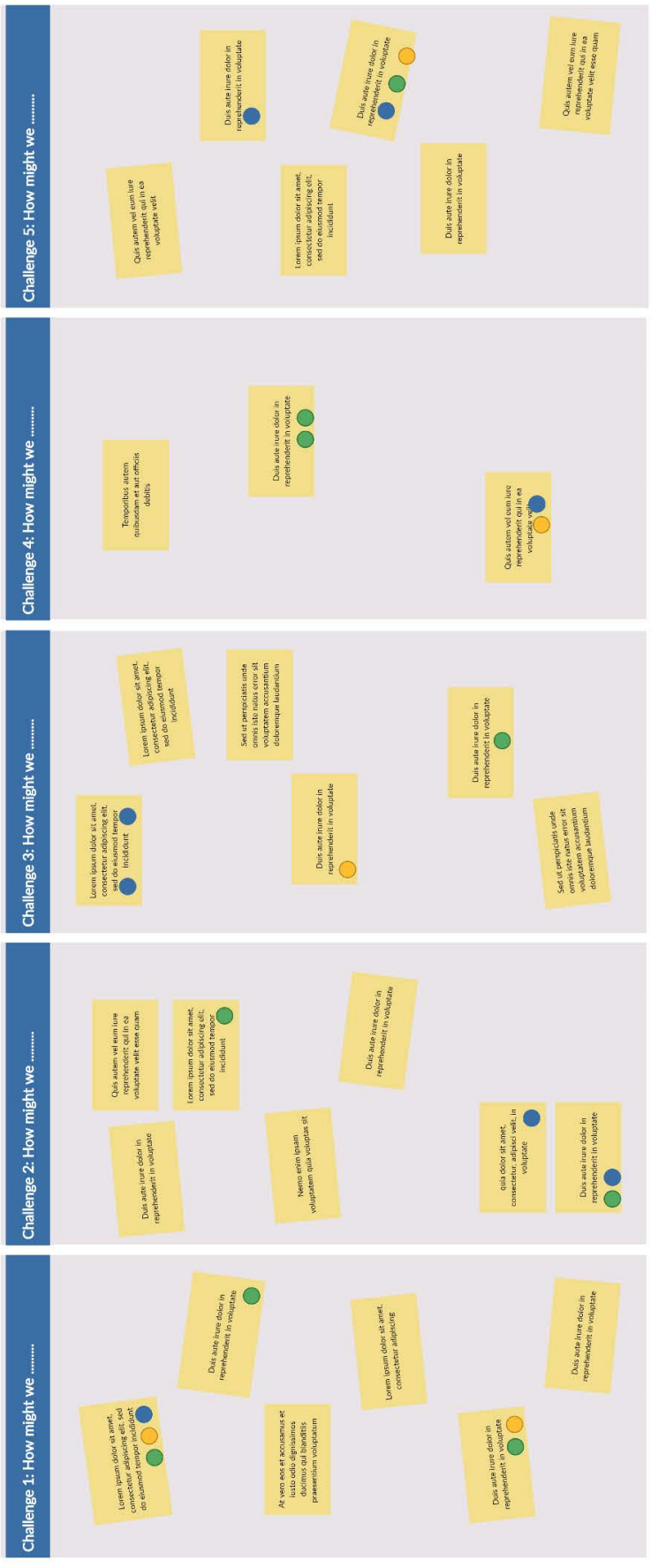



Figure 4: Idea posters with the endorsed ideas in the control group

Figure 5: Idea posters with the endorsed ideas in the treatment group



## 3.3.2 Data

In the first step, the pre-test and post-test documents, which contain the necessary information on the idea selection of participants, were assembled and coded into a dataset. Each idea was given a unique number code. As a second step of data collection, the idea posters were photographed and stored by the research team. Pictures of idea posters during the experiment day are presented in exhibit 4. Participants could not take away post-its or posters. The information on the idea poster was carefully documented by the research coordinators in a separate dataset, including the idea description, the idea creator (via the letter on the back end of the post-it), the amount of stickers and the source of the stickers (via the letters on the stickers). The organizational background (name, education program and hierarchical position) of each participant was linked to the letter assigned to them to complete the second dataset. In a third step, the two datasets were then combined based on the idea number codes and the person letter codes. The unit of observation in our dataset involves the person-idea level, and the dataset consists of all unique combinations of a participant (n=74) and the ideas (n=670) that were generated by the team of that participant (n=2.843). Each observation is built up with a unique code as follows: {person letter}-{education program}-{team number}-{idea number}.

### 3.3.2.1 Measures - Dependent Variable

To capture our outcome parameter of interest - idea selection - we asked each participant, after the sticker voting round, to rank the six most promising ideas generated by their team that best came forward to address the idea challenges and that they wanted to take forward for further elaboration. Based on this collected information, we build up three measures that capture idea selection per participant. We want to emphasize here that our dependent variables capture the individual decisions made by participants, not a team decision, on what ideas to select or not. While group decisions in function of hierarchy are certainly also important (Anderson & Brown, 2010; Keum & See, 2017), we want to consistently compare the effects of hierarchical endorsements without having any group discussions interfere with the decision-making process.

**Idea selection.** Starting with our first dependent variable, arguably the most simple yet robust one, we work with the dichotomous variable *idea selected* as our primary dependent variable.. This

dependent variable turns to 1 if a certain idea is written down by a participant as one of the six favourite ideas on the final idea ranking list. This dichotomous variable is one of the most commonly used approaches to measure idea selection in empirical studies of creativity (Kijkuit & van den Ende, 2010; Reitzig & Sorenson, 2013; Beretta, 2019).

**Idea ranking.** Our second dependent variable relates to the ranking of the best idea (*idea ranking*). As each idea was ranked on a list of six best ideas, we can verify if the rank order of the selected ideas would be affected by our parameters of interest. The dependent variable gives a value of six to the ideas that were ranked as the best idea, a value of five to the ideas ranked as the second best idea, and so on until the last and sixth ranked idea, which receives a numerical value of one. Ideas that did not make it to the ranking of a given person keep a value of zero. While this measure mimics our first one, it does give more weight to the ideas ranked as the very best, which can add to our understanding of the hierarchical endorsement effect on idea selection.

**Hold and shift decisions.** When facing the decision to select an idea, and after been given information about endorsement on that idea, an individual can be in one of two scenarios: a) the endorsement can be in line with the person's initial judgement to select the idea, or b) the endorsement can direct the participant to a previously unconsidered idea. Heading an endorsement can therefore materialize in two outcomes: 1) to hold the initial selection decision or 2) to shift the decision towards considering a previously unconsidered idea (Yaniv & Kleinberger, 2000; Soll & Larrick, 2009; Dalal & Bonaccio, 2010). Hold decisions pertain to those cases where a participant already had in mind to select an idea, but now after receiving (hierarchical) endorsements reinforces his early decision. In contrast, a shift decision pertains to the case where an idea was not yet considered to be selected, but by receiving (hierarchical) endorsements, the participant decided to switch his selection to the (hierarchical) endorsed idea. In this case, the endorsement changes the final pool of ideas selected.

As we intend to explore how the hierarchical endorsement affects the decision-making of organizational members, we test whether hierarchical endorsements mainly manifest hold or shift decisions in idea selection. To capture the initial judgment of participants about what ideas to select, we asked during the experiment each participant to list six ideas that best addressed the idea challenges, before any endorsement had taken place in the idea generation procedure. This serves as a pre-test in

our experimental design. Based on a comparison of initial ranked list and the final idea ranking list, we construct two dependent variables that outline the hold and shift decisions of each participant per idea, being a) *hold decision* and b) *shift decision*.

### 3.3.2.2 Measures - Explanatory variables

**Hierarchical endorsement.** As we are interested to understand the effect of hierarchical endorsements on idea selection, we want to separate the overall endorsement effect, captured by the total amount of stickers given to a certain idea, from its hierarchical function. We therefore use the *share of stickers given by a high hierarchical group* as independent variable in our regressions. Within our focal organization, professors are considered to be those with a high hierarchical rank. This was also confirmed in the answers of the participants in the post-experiment survey, as more than 85% of the participants pointed out in the post-experiment survey that the professors are the ones with the authority power to decide what ideas to develop and integrate in the organisation. We group professional staff and student representatives into the low-hierarchy group. In total of the 74 attendees of the ideation experiment, 30 (40%) were professors, 32 (43%) staff members and 12 (16%) student representatives. This closely mirrors the distribution in the education program committees.

### 3.3.2.2 Measures - Control Variables

To control for possible remaining differences in the treatment and control groups, we include several sets of variables in the regressions including: total endorsement, team size, number of ideas, idea quality, idea length, hierarchical rank of the idea generator, prior work collaboration, own idea of a person, as well as several idea challenges and poster quadrants dummies.

**Total endorsement.** The total endorsement effect is measured by the total amount of stickers that are given to a specific idea. By controlling for the total endorsement, we can identify the hierarchy effect of endorsements via the share of stickers given by professors.

**Number of ideas**. The idea generation output of a team can differ greatly, as ideation studies have shown (Girotra et al., 2010; Wooten & Ulrich, 2017). Since each individual participant can only select six ideas out of the total of ideas their group generated, it is important to control for idea generation output, e.g. the number of ideas that the team generated.

**Idea quality.** Since organizational members are argued to have formed, through socialization, a shared consensus of what a valuable idea for the organization should embody (March & Simon, 1958; Nelson & Winter, 1982; Frederickson, 1986; Kijkuit & Van den Ende, 2007), endorsements might correlate with the inherent quality of ideas. To control for idea quality, all generated ideas were rated by two campus Vice-Deans of Education at the University organization on their 'value potential' and 'feasibility.' Both criteria are frequently used to assess the quality of an idea in the creativity literature (Dean et al., 2006; Amabile & Hennessey, 2011; Adamczyck et al., 2011; Poetz & Schreier, 2012). The criteria are defined as 'the degree to which an idea addresses the challenge and has potential to create value for a customer or the internal organization' and 'the degree to which an idea can be easily implemented and does not violate known constraints' respectively and are rated on an ordinal 1-5 Likert scale (1 – not at all/2 – not really/ 3 -fairly/ 4- very/ 5 – extremely). Inter-rater reliability between the evaluations of the two raters is considerably high, having a percent agreement of 86 percent and a Gwet's AC value of 0.64, indicating moderate interrater agreement. Both measures of idea quality are calculated as average values of the ratings of the two raters.

**Idea length.** As prior research has shown that idea selection is driven by the length of the idea description, generally favouring longer but not overly lengthy ideas (Reitzig and Sorenson, 2013), we control for idea length. Idea length is measured as the total number of words that make up an idea.

**Hierarchy of idea creator.** We include controls for the hierarchical rank of the idea creator. Ideas that are generated by participants with a high hierarchical rank may be perceived as higher-quality ideas and are therefore more likely selected. We create two dummies that signal whether an idea is generated by a *participant with a high hierarchical rank* (professor) or a participant with a *low hierarchical rank* (professional staff or student representative). This information is known to the idea selector as idea creators were asked to (briefly) explain an idea to their team members when they place a post-it with the idea on the idea challenge poster (see idea generation guidelines in figure 4).

**Prior work experience.** As each participant is part of the same organization, we might expect that there could be differences in relational strength between team members, expressed as the frequency and intensity of prior working experience (Tzabbar & Vestal, 2019). Therefore, through the distribution of the post-experiment survey (see appendix 3), we asked each participant to express the intensity of their

prior working experience with the members in their team on a three-level scale (0 - none | 1 - some prior working experience | 2 - a lot of prior working experience). Regarding the observation where the idea creator and the idea selector are the same person, we have turned the value to three. The control variable *prior work experience* centres around one.

**Own idea**. Prior research has shown that there exists a self-selection bias in idea selection whereby persons give priority to their own ideas (Keum & See, 2017). To control for a possible self-selection bias, we have therefore created a binary variable that takes a value equal to one for the ideas that are generated by the person that has to select the best ideas.

**Idea challenges**. We create dummy variables *(idea challenge one to five)* for the five idea challenges that were part of the ideation experiment, and which are displayed at the top of each idea poster. We control for this as some challenges could be easier or harder to generate ideas for, or participants could have a selection preference for certain idea challenges.

**Poster quadrant.** We also control for the fact that ideas may be placed on different quadrants of the idea posters. Typically, when one would read the post-it noted ideas on the idea poster, one would start from the top left (quadrant one) and proceed to the right (quadrant two), then lower-left side of the poster (quadrant three) and finally to the lower-right side of the poster (quadrant four). In this way, we control the order of ideas as they are likely to be read by the participants when voting for the ideas, or for the participants when they need to select their ideas.

Table 18 lists the variables of our study, provides a short description and reports summary statistics for the entire dataset (i.e. treatment and control group taken together).

**Table 18: Key variables and summary statistics**

| **Variables** | Mean | S.D. | Min | Max | Type | Description |
|---|---|---|---|---|---|---|
| *Dependent variables* | | | | | | |
| Idea selection | 0.152 | 0.359 | 0 | 1 | Binary | Indicates in a binary fashion if an idea is selected by a participant |
| Idea ranking | 0.523 | 138.23 | 0 | 6 | 1 to 6 | Indicates the ranking of the idea on the ranking list of a participant |
| Hold decision | 0.089 | 0.285 | 0 | 1 | Binary | Indicates whether the observed idea was listed in both the initial idea evaluation document and in the second idea evaluation document (selection of ideas) |
| Shift decision | 0.061 | 0.239 | 0 | 1 | Binary | Indicates whether the observed idea was not listed in the first evaluation document, but was listed in the second idea evaluation document (selection of ideas) |
| *Explanatory variables* | | | | | | |
| Share of high-hierarchy endorsements | 0.259 | 0.341 | 0 | 1 | Percent | The share of endorsements given by a person high in the hierarchy divided by the total endorsements |
| *Control variables* | | | | | | |
| Total endorsements | 1.771 | 2.108 | 0 | 16 | Count | Total endorsement an idea receives |
| Number of Ideas | 46.59 | 20.55 | 14 | 82 | Count | The number of ideas generated by the team |
| Idea value potential | 3.356 | 0.835 | 1 | 5 | Ordinal | The value potential assessment of an idea assessed by two expert raters |
| Idea feasibility | 2.867 | 0.751 | 1 | 5 | Ordinal | The feasibility assessment of an idea assessed by two expert raters |
| Idea length | 15.59 | 9.600 | 1 | 67 | Count | The number of words of an idea holds |
| Prior work experience | 0.418 | 0.657 | 0 | 2 | Ordinal | Indicated level of prior collaboration between a person and the creator of an idea |
| Own idea | 0.230 | 0.420 | 0 | 1 | Binary | Indicates when a person has to make a decision to select their own idea |
| High-hierarchy idea creator | 0.361 | 0.480 | 0 | 1 | Dummy | Idea created by a high-hierarchy participant |
| Low-hierarchy idea creator | 0.458 | 0.498 | 0 | 1 | Dummy | Idea created by low-hierarchy participant |
| Poster Quadrant 1 | 0.318 | 0.465 | 0 | 1 | Dummy | The idea post-it note is placed on the left upper corner of poster |
| Poster Quadrant 2 | 0.241 | 0.427 | 0 | 1 | Dummy | The idea post-it note is placed on the right upper corner of poster |
| Poster Quadrant 3 | 0.237 | 0.425 | 0 | 1 | Dummy | The idea post-it note is placed on the left lower corner of poster |
| Poster Quadrant 4 | 0.203 | 0.402 | 0 | 1 | Dummy | The idea post-it note is placed on the right lower corner of poster |
| Idea challenge 1 | 0.237 | 0.425 | 0 | 1 | Dummy | Idea poster with the first idea challenge |
| Idea challenge 2 | 0.131 | 0.338 | 0 | 1 | Dummy | Idea poster with the second idea challenge |
| Idea challenge 3 | 0.217 | 0.412 | 0 | 1 | Dummy | Idea poster with the third idea challenge |
| Idea challenge 4 | 0.198 | 0.399 | 0 | 1 | Dummy | Idea poster with the fourth idea challenge |
| Idea challenge 5 | 0.214 | 0.410 | 0 | 1 | Dummy | Idea poster with the fifth idea challenge |

*Number of observations = 2.843*

# 3.4 Empirical Results

## 3.4.1 Summary Statistics and Randomization Check

Given the block randomization of the education programs, we expect certain parameters listed above to be balanced between control and treatment groups, although randomization does not guarantee perfectly balanced or identical groups. A Wald chi-square test shows us that we cannot reject the assumption that both groups are equal (chi(2) = 40.36, p > 0.01). To verify where randomization generated balance or imbalance across covariates, we compared means between the treatment and control groups by means of t-tests (see table 19).

Table 19: Sample means of treatment and control group

| | Sample Mean | | t-test of equality of means |
|---|---|---|---|
| | Control Group | Treatment Group | (p-values) |
| Idea selection | 0.151 | 0.152 | 0.954 |
| Idea ranking | 0.503 | 0.530 | 0.643 |
| Share of high-hierarchy endorsements | 0.239 | 0.320 | 0.000 |
| Total endorsements | 1.35 | 1.96 | 0.000 |
| Number of ideas | 53.45 | 43.43 | 0.000 |
| Idea value | 3.227 | 3.415 | 0.000 |
| Idea feasibility | 2.846 | 2.877 | 0.314 |
| Idea length | 14.54 | 16.07 | 0.000 |
| Own idea | 0.219 | 0.235 | 0.359 |
| Prior work experience | 1.14 | 1.09 | 0.323 |
| High-hierarchy idea creator | 0.482 | 0.306 | 0.000 |
| Poster quadrant 1 | 0.385 | 0.287 | 0.000 |
| Poster quadrant 2 | 0.228 | 0.247 | 0.271 |
| Poster quadrant 3 | 0.244 | 0.234 | 0.520 |
| Poster quadrant 4 | 0.141 | 0.231 | 0.000 |
| Idea challenge 1 | 0.202 | 0.254 | 0.002 |
| Idea challenge 2 | 0.110 | 0.141 | 0.020 |
| Idea challenge 3 | 0.226 | 0.213 | 0.446 |
| Idea challenge 4 | 0.231 | 0.183 | 0.003 |
| Idea challenge 5 | 0.230 | 0.207 | 0.159 |

Based on the mean comparison, one can observe that the ideas in the treatment group received, on average, more endorsements (1.96 versus 1.35) than the ideas in the control group. While statistically significant, the difference in the percentage of high-hierarchy endorsements (0.32 versus 0.30) is closely similar in both groups. In terms of the control variables, there is a significant variance in terms of the average number of ideas generated per team. In the experiment, the control group generated more ideas, but at closer examination we found this is largely driven by one outlier team that generated the most (n=83) ideas. The average idea length in the control group is slightly shorter (14.5 versus 16.1) compared to the treatment group. The percentage of ideas generated by high hierarchical persons is higher in the treatment than the control group. Apart from these differences, the treatment and control groups appear very similar in terms of the prior working experience with each other and the percentage of own generated ideas. Both groups are also largely similar in terms of the distribution of ideas over idea challenges and the positioning of idea notes on the idea poster quadrants.

Tables 20 and 21 report the correlations amongst our variables, separately for the treatment and control groups. The total amount of endorsements has a positive and significant correlation with idea selection in both groups, while the share of high-hierarchy endorsements has a stronger positive correlation with idea selection in the treatment than the control group. There are no high correlations amongst the control variables, indicating no problems with multicollinearity.

Table 20: Correlation matrices - control group

| | Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Idea selection (DV) | 1 | | | | | | | | | | | | | | | | | | | | | |
| 2 | Idea ranking (DV) | 0.868 | 1 | | | | | | | | | | | | | | | | | | | | |
| 3 | Hold decisions (DV) | 0.760 | 0.743 | 1 | | | | | | | | | | | | | | | | | | | |
| 4 | Shift decisions (DV) | 0.573 | 0.385 | -0.079 | 1 | | | | | | | | | | | | | | | | | | |
| 5 | Share of high-hierarchy endorsements | 0.081 | 0.061 | 0.036 | 0.093 | 1 | | | | | | | | | | | | | | | | | |
| 6 | Total endorsements | 0.331 | 0.287 | 0.496 | 0.256 | 0.496 | 1 | | | | | | | | | | | | | | | | |
| 7 | N° of ideas | -0.237 | -0.201 | -0.048 | -0.315 | -0.048 | -0.315 | 1 | | | | | | | | | | | | | | | |
| 8 | Idea value potential | 0.091 | 0.075 | 0.070 | 0.052 | -0.001 | 0.063 | -0.051 | 1 | | | | | | | | | | | | | | |
| 9 | Idea feasibility | 0.011 | 0.013 | 0.011 | -0.003 | 0.028 | 0.017 | -0.056 | 0.586 | 1 | | | | | | | | | | | | | |
| 10 | Idea length | -0.051 | -0.039 | )0.034 | -0.028 | -0.061 | -0.083 | -0.003 | -0.080 | -0.032 | 1 | | | | | | | | | | | | |
| 11 | Prior work experience | 0.096 | 0.099 | 0.060 | 0.065 | -0.012 | -0.043 | 0.008 | 0.037 | 0.003 | 0.105 | 1 | | | | | | | | | | | |
| 12 | Own idea | 0.151 | 0.154 | 0.097 | 0.099 | 0.009 | 0.004 | -0.046 | -0.001 | -0.008 | 0.011 | 0.822 | 1 | | | | | | | | | | |
| 13 | High-hierarchy idea creator | 0.046 | 0.034 | 0.019 | 0.056 | -0.065 | 0.029 | -0.171 | 0.100 | 0.249 | 0.035 | -0.059 | -0.021 | 1 | | | | | | | | | |
| 14 | Poster quadrant 1 | -0.002 | -0.015 | -0.018 | 0.009 | 0.065 | 0.037 | -0.188 | 0.039 | 0.020 | -0.075 | 0.013 | 0.006 | 0.000 | 1 | | | | | | | | |
| 15 | Poster quadrant 2 | 0.066 | 0.086 | 0.089 | -0.001 | -0.085 | 0.070 | -0.114 | -0.100 | -0.071 | -0.044 | -0.043 | 0.006 | 0.016 | -0.430 | 1 | | | | | | | |
| 16 | Poster quadrant 3 | -0.009 | -0.010 | -0.032 | 0.036 | 0.076 | -0.043 | 0.185 | 0.050 | 0.030 | 0.081 | 0.047 | -0.001 | -0.140 | -0.451 | -0.309 | 1 | | | | | | |
| 17 | Poster quadrant 4 | -0.064 | -0.069 | -0.043 | -0.046 | -0.081 | -0.082 | 0.172 | 0.004 | 0.020 | 0.059 | -0.025 | -0.014 | 0.152 | -0.321 | -0.220 | -0.231 | 1 | | | | | |
| 18 | Idea poster 1 | -0.034 | -0.036 | 0.010 | -0.053 | -0.056 | -0.121 | 0.047 | 0.026 | -0.008 | -0.040 | 0.045 | -0.011 | 0.004 | -0.032 | 0.044 | 0.004 | -0.012 | 1 | | | | |
| 19 | Idea poster 2 | 0.000 | -0.009 | -0.027 | 0.019 | -0.016 | -0.033 | -0.124 | -0.142 | 0.043 | 0.202 | 0.002 | 0.011 | 0.158 | 0.064 | -0.022 | -0.010 | -0.051 | -0.176 | 1 | | | |
| 20 | Idea poster 3 | 0.039 | 0.028 | 0.000 | 0.059 | 0.046 | 0.129 | -0.038 | -0.102 | -0.136 | -0.035 | -0.023 | -0.003 | -0.063 | -0.034 | 0.048 | -0.010 | 0.002 | -0.271 | -0.190 | 1 | | |
| 21 | Idea poster 4 | 0.084 | 0.058 | 0.059 | 0.056 | 0.094 | 0.106 | -0.045 | 0.124 | 0.017 | -0.172 | -0.040 | -0.004 | 0.014 | 0.004 | -0.059 | 0.067 | -0.018 | -0.275 | -0.193 | -0.297 | 1 | |
| 22 | Idea poster 5 | -0.091 | -0.044 | -0.048 | -0.079 | -0.075 | -0.095 | 0.131 | 0.057 | 0.092 | 0.095 | 0.017 | 0.010 | -0.073 | 0.012 | -0.014 | -0.053 | 0.066 | -0.275 | -0.192 | -0.296 | -0.300 | 1 |

Table 21: Correlation matrices - treatment group

| | Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Idea selection (DV) | 1 | | | | | | | | | | | | | | | | | | | | | |
| 2 | Idea ranking (DV) | 0.882 | 1 | | | | | | | | | | | | | | | | | | | | |
| 3 | Hold decisions (DV) | 0.730 | 0.690 | 1 | | | | | | | | | | | | | | | | | | | |
| 4 | Shift decisions (DV) | 0.593 | 0.471 | -0.080 | 1 | | | | | | | | | | | | | | | | | | |
| 5 | Share of high-hierarchy endorsements | 0.143 | 0.131 | 0.102 | 0.087 | 1 | | | | | | | | | | | | | | | | | |
| 6 | Total endorsements | 0.334 | 0.319 | 0.151 | 0.277 | 0.333 | 1 | | | | | | | | | | | | | | | | |
| 7 | N° of ideas | -0.143 | -0.118 | -0.121 | -0.055 | -0.177 | -0.162 | 1 | | | | | | | | | | | | | | | |
| 8 | Idea value potential | 0.107 | 0.104 | 0.066 | 0.076 | 0.131 | 0.237 | 0.032 | 1 | | | | | | | | | | | | | | |
| 9 | Idea feasibility | 0.061 | 0.055 | 0.018 | 0.062 | 0.082 | 0.195 | -0.015 | 0.484 | 1 | | | | | | | | | | | | | |
| 10 | Idea length | 0.085 | 0.076 | 0.094 | 0.028 | 0.053 | 0.120 | -0.126 | 0.043 | -0.010 | 1 | | | | | | | | | | | | |
| 11 | Prior work experience | 0.088 | 0.090 | 0.123 | 0.000 | -0.024 | -0.048 | 0.065 | -0.023 | -0.021 | -0.036 | 1 | | | | | | | | | | | |
| 12 | Own idea | 0.129 | 0.125 | 0.155 | 0.021 | -0.013 | -0.022 | 0.013 | -0.016 | 0.000 | -0.009 | 0.870 | 1 | | | | | | | | | | |
| 13 | High-hierarchy idea creator | 0.023 | 0.004 | 0.047 | -0.028 | 0.015 | 0.062 | -0.050 | 0.022 | -0.053 | 0.020 | -0.013 | 0.001 | 1 | | | | | | | | | |
| 14 | Poster quadrant 1 | 0.028 | 0.037 | 0.028 | 0.004 | 0.080 | 0.130 | -0.067 | 0.047 | 0.048 | -0.003 | -0.048 | -0.006 | 0.027 | 1 | | | | | | | | |
| 15 | Poster quadrant 2 | 0.029 | 0.012 | 0.016 | 0.024 | -0.037 | -0.012 | 0.004 | 0.018 | 0.014 | 0.032 | 0.015 | 0.002 | 0.070 | -0.364 | 1 | | | | | | | |
| 16 | Poster quadrant 3 | -0.004 | -0.012 | -0.016 | 0.012 | 0.016 | -0.013 | 0.043 | -0.025 | -0.034 | 0.027 | 0.017 | 0.000 | -0.089 | -0.350 | -0.316 | 1 | | | | | | |
| 17 | Poster quadrant 4 | -0.055 | -0.040 | -0.031 | -0.041 | -0.064 | -0.112 | 0.024 | -0.043 | -0.032 | -0.056 | 0.018 | 0.003 | -0.011 | -0.348 | -0.314 | -0.303 | 1 | | | | | |
| 18 | Idea poster 1 | 0.071 | 0.085 | 0.058 | 0.039 | -0.027 | -0.035 | -0.110 | 0.019 | -0.044 | 0.110 | 0.001 | 0.002 | 0.023 | -0.028 | -0.019 | -0.004 | 0.055 | 1 | | | | |
| 19 | Idea poster 2 | 0.020 | 0.043 | 0.009 | 0.010 | 0.005 | 0.079 | 0.034 | -0.038 | 0.041 | 0.002 | -0.014 | -0.006 | -0.029 | 0.041 | 0.091 | -0.068 | -0.069 | -0.237 | 1 | | | |
| 20 | Idea poster 3 | -0.039 | -0.042 | -0.02 | -0.031 | -0.008 | -0.007 | -0.031 | -0.145 | -0.045 | -0.021 | -0.003 | 0.001 | -0.053 | -0.067 | -0.039 | 0.017 | 0.095 | -0.303 | -0.211 | 1 | | |
| 21 | Idea poster 4 | -0.012 | -0.024 | -0.001 | -0.013 | 0.094 | 0.032 | 0.117 | 0.196 | 0.098 | -0.062 | 0.010 | 0.006 | 0.060 | -0.004 | 0.039 | 0.014 | -0.049 | -0.276 | -0.192 | -0.246 | 1 | |
| 22 | Idea poster 5 | -0.043 | -0.063 | -0.046 | -0.006 | -0.057 | -0.053 | 0.008 | -0.028 | -0.035 | -0.039 | 0.004 | -0.005 | -0.003 | 0.067 | -0.054 | 0.032 | -0.048 | -0.298 | -0.207 | -0.266 | -0.242 | 1 |

## 3.4.2 Matching and first comparison of means

As a first test of our research questions, we conduct a simple comparison of the probabilities that idea selectors select high-hierarchy endorsed ideas versus non-high-hierarchy endorsed ideas. We do this separately for the treatment and control group. To allow for a meaningful comparison, we apply a coarsened matching procedure (CEM) in order to match observations that received the same number of endorsements. To find meaningful matches between the observations, we exclusively use the observations that received at least one endorsement, thus excluding the observations that received no endorsements at all (about one third of the generated ideas). From the ideas that received at least one endorsement, we observe that the majority of ideas (92 percent) received between one to five endorsements in total. We therefore constructed six 'strata' based on the number of endorsements (one, two, three, four, five or more than five) for the CEM matching. After matching each idea to multiple similar ideas based on the absolute number of endorsements using the matching algorithm[9], we run a two-sample t-test on the matched observations to determine whether there is a significant difference between the ideas that receive high-hierarchy endorsements with those ideas that did not. Table 22 displays the averages values of the selection variables (idea selection, idea ranking, switch decision, hold decision) for each group and the difference between them, and reports this both for the treatment and control group separately. The test of means indicates that there is a significant difference between the hierarchically endorsed and not-endorsed ideas in our treatment sample, while no such significant difference is found for the control group.

[9] After running the matching algorithm, we observe a significant difference regarding the matching variable between the high-hierarchy endorsed ideas and the no-high-hierarchy endorsed ideas, but we do check for this in a supplementary analysis. In an alternative approach to matching, we matched each high-hierarchy endorsed idea with exactly one non-hierarchy endorsed idea. After doing so, we witness that the difference in absolute amount of endorsements between the two groups is no longer significant. Using this option, we replicate the same results when comparing the hierarchy endorsed ideas with the non-hierarchy endorsed ideas.

Table 22: Comparison of the DV's of matched observations

| | Treatment group | | | Control group | | |
|---|---|---|---|---|---|---|
| | High hierarchy endorsements | No high hierarchy endorsements | Difference and ttest | High hierarchy endorsements | No high hierarchy endorsements | Difference and ttest |
| Idea Selection | 0.215 | 0.105 | 0.111 *** | 0.166 | 0.140 | 0.026 |
| | (0.014) | (0.306) | | (0.021) | (0.027) | |
| Idea Ranking | 0.767 | 0.330 | 0.437 *** | 0.555 | 0.463 | 0.092 |
| | (0.059) | (0.525) | | (0.079) | (0.101) | |
| Shift Decision | 0.089 | 0.049 | 0.039 ** | 0.083 | 0.042 | 0.041* |
| | (0.049) | (0.089) | | (0.153) | (0.158) | |
| Hold Decision | 0.126 | 0.053 | 0.073 *** | 0.086 | 0.097 | -0.011 |
| | (0.339) | (0.221) | | (0.156) | (0.232) | |
| *Observations* | *775* | *448* | | *324* | *164* | |

*, **, *** indicate significance at 10, 5, and 1 percent level.

## 3.4.3 Multi-variate analysis

We next turn to multivariate regressions to control for remaining imbalances that occurred due to the randomization procedure of the experiment. To analyse the effect of hierarchical endorsements on idea selection, we regress our two dependent variables (*idea selected and idea ranking*) on the share of high-hierarchy endorsements. As our primary dependent variable *idea selected* is binary in nature and occurs infrequently (15% of ideas are selected ), we use logistic regressions models to estimate the effect of hierarchical endorsement on idea selection.[10] We use ordered probit regression models to examine how hierarchical endorsements impact on the ranking of selected ideas.

Table 23 reports the regression results for the treatment group. Table 24 mirrors the same regression model build-up, but for the control group. We apply simple estimation techniques to describe the differences in idea selection between treatment and control groups and to identify in particular the effect of hierarchical endorsements.

[10] We replicated our analyses using rare event logistic regression (King & Zeng, 2001), finding similar results.

Table 24: Logit and ordered probit regression models for the treatment group

| | **Logit regression** | | **Ordered probit regression** | |
|---|---|---|---|---|
| | Model I | Model II | Model III | Model IV |
| *Dependent variable* | *Idea selected* | | *Idea ranked* | |
| Share of high-hierarchy endorsements | | 0.500** | | 0.245** |
| | | (0.221) | | (0.117) |
| Total endorsements | 0.309*** | 0.298*** | 0.160*** | 0.153*** |
| | (0.016) | (0.029) | (0.014) | (0.014) |
| N° of ideas | -0.009*** | -0.017*** | -0.007*** | -0.006*** |
| | (0.003) | (0.005) | (0.003) | (0.003) |
| Idea value potential | 0.212** | 0.191* | 0.151** | 0.141** |
| | (0.104) | (0.105) | (0.055) | (0.055) |
| Idea feasibility | -0.096 | -0.087 | -0.097 | -0.091 |
| | (0.108) | (0.107) | (0.058) | (0.058) |
| Idea length | 0.007 | 0.007 | 0.003 | 0.003 |
| | (0.004) | (0.007) | (0.003) | (0.003) |
| Prior work experience | -0.188 | -0.189 | -0.072 | -0.071 |
| | (0.136) | (0.136) | (0.068) | (0.068) |
| Own idea | 1.437*** | 1.446*** | 0.708*** | 0.705*** |
| | (0.378) | (0.378) | (0.189) | (0.189) |
| High-hierarchy idea creator | 0.114 | 0.129 | -0.002 | 0.001 |
| | (0.148) | (0.148) | (0.077) | (0.078) |
| Poster Quadrant 1 | 0.027 | 0.021 | 0.029 | 0.023 |
| | (0.206) | (0.206) | (0.105) | (0.106) |
| Poster Quadrant 2 | 0.332 | 0.349 | 0.129 | 0.132 |
| | (0.206) | (0.206) | (0.107) | (0.107) |
| Poster Quadrant 3 | 0.218 | 0.203 | 0.077 | 0.066 |
| | (0.213) | (0.214) | (0.110) | (0.110) |
| Idea poster 1 | 0.548*** | 0.541*** | 0.392*** | 0.393*** |
| | (0.209) | (0.210) | (0.109) | (0.109) |
| Idea poster 2 | 0.193 | 0.168 | 0.206 | 0.200 |
| | (0.247) | (0.248) | (0.127) | (0.127) |
| Idea poster 3 | -0.011 | -0.027 | 0.048 | 0.042 |
| | (0.234) | (0.235) | (0.120) | (0.121) |
| Idea poster 4 | 0.061 | 0.014 | 0.039 | 0.041 |
| | (0.239) | (0.240) | (0.124) | (0.124) |
| _cons | -2.862*** | -2.988*** | | |
| | (0.487) | (0.494) | | |
| cut1 | | | 1.727 | 1.790 |
| | | | (0.255) | (0.258) |
| cut2 | | | 1.854 | 1.909 |
| | | | (0.255) | (0.206) |
| cut3 | | | 2.004 | 2.069 |
| | | | (0.256) | (0.257) |
| cut4 | | | 2.219 | 2.257 |
| | | | (0.257) | (0.259) |
| cut5 | | | 2.443 | 2.508 |
| | | | (0.259) | (0.261) |
| cut6 | | | 2.831 | 2.896 |
| | | | (0.264) | (0.265) |
| N | 1.945 | 1.945 | 1.945 | 1.945 |
| ll | -699.454 | -696.984 | -1212.317 | -1212.174 |
| p | 0.000 | 0.000 | 0.000 | 0.000 |
| LR chi2 | 260.10 | 265.04 | 252.78 | 257.07 |

*, **, *** indicate significance at 10, 5, and 1 percent level.

Table 25: Logit and ordered probit regression models for the control group

| | **Logit regression** | | **Ordered Probit regression** | |
|---|---|---|---|---|
| | Model I | Model II | Model III | Model IV |
| *Dependent variable* | *Idea selected* | | *Idea ranking* | |
| Share of high-hierarchy endorsements | | -0.471 | | -0.215 |
| | | (0.367) | | (0.186) |
| Total endorsements | 0.493*** | 0.545*** | 0.243*** | 0.266*** |
| | (0.071) | (0.082) | (0.037) | (0.042) |
| N° of ideas | -0.017*** | -0.016*** | -0.008*** | -0.008*** |
| | (0.005) | (0.005) | (0.002) | (0.002) |
| Idea value potential | 0.376** | 0.348** | 0.196** | 0.183** |
| | (0.153) | (0.154) | (0.078) | (0.079) |
| Idea feasibility | -0.235 | -0.201 | -0.128 | -0.109 |
| | (0.158) | (0.160) | (0.085) | (0.086) |
| Idea length | 0.001 | 0.001 | 0.001 | 0.001 |
| | (0.013) | (0.013) | (0.007) | (0.007) |
| Prior work experience | -0.073 | -0.069 | -0.046 | -0.046 |
| | (0.181) | (0.181) | (0.093) | (0.092) |
| Own idea | 1.206** | 1.208** | 0.694*** | 0.699*** |
| | (0.491) | (0.490) | (0.253) | (0.253) |
| High-hierarchy idea creator | 0.060 | 0.031 | 0.012 | 0.008 |
| | (0.223) | (0.225) | (0.116) | (0.116) |
| Poster Quadrant 1 | 0.171 | 0.224 | 0.168 | 0.199 |
| | (0.399) | (0.404) | (0.202) | (0.204) |
| Poster Quadrant 2 | 0.578 | 0.585 | 0.412 | 0.416 |
| | (0.414) | (0.416) | (0.211) | (0.211) |
| Poster Quadrant 3 | 0.477 | 0.535 | 0.309 | 0.341 |
| | (0.415) | (0.422) | (0.211) | (0.214) |
| Idea poster 1 | 0.405 | 0.417 | 0.122 | 0.124 |
| | (0.364) | (0.365) | (0.186) | (0.186) |
| Idea poster 2 | 0.499 | 0.484 | 0.145 | 0.141 |
| | (0.418) | (0.418) | (0.215) | (0.214) |
| Idea poster 3 | 0.455 | 0.462 | 0.099 | 0.096 |
| | (0.336) | (0.337) | (0.175) | (0.175) |
| Idea poster 4 | 0.671** | 0.674** | 0.223 | 0.218 |
| | (0.336) | (0.337) | (0.172) | (0.173) |
| _cons | -3.421*** | -3.434*** | | |
| | (0.788) | (0.785) | | |
| cut1 | | | 1.869 | 1.875 |
| | | | (0.402) | (0.399) |
| cut2 | | | 1.982 | 1.988 |
| | | | (0.401) | (0.400) |
| cut3 | | | 2.137 | 2.141 |
| | | | (0.401) | (0.401) |
| cut4 | | | 2.340 | 2.348 |
| | | | (0.403) | (0.409) |
| cut5 | | | 2.607 | 2.662 |
| | | | (0.406) | (0.411) |
| cut6 | | | 3.037 | 3.048 |
| | | | (0.413) | (0.412) |
| N | 898 | 898 | 898 | 898 |
| ll | -309.564 | -308.709 | -535.783 | -534.880 |
| p | 0.000 | 0.000 | 0.000 | 0.000 |
| LR chi2 | 144.55 | 146.26 | 127.36 | 129.17 |

*, **, *** indicate significance at 10, 5, and 1 percent level.

In model I and III, we introduce our baseline model, that only includes the control variables. The covariates that we include in our baseline model should not correlate with the treatment effect, as they are structurally separated from the treatment. Yet, we include them here to sharpen our estimation and to check the consistency between treatment and control group. The only exception is the variable *total endorsements* which is by construction moderately correlated (0.30) with our focal variable *share of high-hierarchy endorsement* as the latter takes value zero for ideas without endorsements. We introduce the hierarchical endorsement variables in models II and IV.

As a formal test of our research question, we investigate the impact of hierarchical endorsements on idea selection. For the treatment group (Table 23), estimates from model II support our prediction that hierarchical endorsements, given by high-hierarchy organizational members, positively affect idea selection. The coefficient of high-hierarchy endorsements is positive and significant ($\beta = 0.500$, $p < 0.05$). For the control group, we find no evident relationship between idea selection and high-hierarchy endorsements ($\beta = -0.471$, $p > 0.10$). Next, we investigate how the idea ranking is affected by hierarchical endorsements. For the treatment group, estimates from model IV in Table 24 show that the idea ranking is positively associated with high-hierarchy endorsements ($\beta = 0.245$, $p < 0.05$). The ordered probability regressions for the control group in Table 24 show no significant relationship between hierarchical endorsements and idea ranking ($\beta = -0.215$, $p > 0.10$).

To explore how the hierarchical endorsement affects the decision-making process of individuals, we test whether hierarchical endorsements mainly manifest hold or shift decisions in idea selection. Of those ideas that were part of participants initial pre-endorsement idea selection, 40 percent effectively entered the final idea selection without having been considered in the pre-selection (shift decisions), while 60 percent of the ideas are held from the pre-endorsement selection list to the post-endorsement selection list (hold decision). In Table 25, we present logistic regression models that estimate hold decisions and switch decisions in idea selection. On the right-hand side (model III-IV), we present regression on hold decisions.

Table 25: Logit regressions for hold and shift decisions

| Logit regression | Model I | Model II | Model III | Model IV |
|---|---|---|---|---|
| | Treatment group | Control group | Treatment group | Control group |
| *Dependent variable* | *Shift decision* | | *Hold decision* | |
| Share of high-hierarchy endorsements | 0.372 | -0.387 | 0.592** | -0.325 |
| | (0.340) | (0.539) | (0.260) | (0.447) |
| Total endorsements | 0.303*** | 0.680*** | 0.122*** | 0.326*** |
| | (0.035) | (0.123) | (0.031) | (0.095) |
| N° of ideas | -0.000 | -0.006 | -0.025*** | -0.026*** |
| | (0.007) | (0.007) | (0.007) | (0.006) |
| Idea value potential | 0.123 | 0.368 | 0.263 | 0.285 |
| | (0.154) | (0.227) | (0.129) | (0.181) |
| Idea feasibility | -0.004 | -0.423 | -0.155 | -0.116 |
| | (0.158) | (0.253 | (0.132) | (0.188) |
| Idea length | -0.004 | 0.004 | 0.021*** | 0.008 |
| | (0.010) | (0.021) | (0.007) | (0.016) |
| Prior work experience | -0.252 | -0.050 | -0.071 | -0.093 |
| | (0.191) | (0.271) | (0.174) | (0.217) |
| Own idea | 0.939* | 1.128 | 1.385*** | 0.950 |
| | (0.542) | (0.736) | (0.476) | (0.593) |
| High-hierarchy idea creator | -0.413* | 0.575* | 0.349*** | -0.142 |
| | (0.229) | (0.344) | (0.178) | (0.262) |
| Poster Quadrant 1 | -0.152 | 0.931 | 0.135 | -0.064 |
| | (0.311) | (0.631) | (0.246) | (0.468) |
| Poster Quadrant 2 | 0.473 | 0.619 | 0.172 | 0.539 |
| | (0.301) | (0.658) | (0.254) | (0.468) |
| Poster Quadrant 3 | 0.239 | 1.193* | 0.037 | 0.184 |
| | (0.315) | (0.643) | (0.265) | (0.493) |
| Idea poster 1 | 0.419 | 0.356 | 0.541** | 0.456 |
| | (0.299) | (0.661) | (0.262) | (0.404) |
| Idea poster 2 | -0.095 | 0.841 | 0.350 | -0.108 |
| | (0.359) | (0.665) | (0.308) | (0.519) |
| Idea poster 3 | -0.219 | 1.015* | 0.172 | -0.059 |
| | (0.337) | (0.555) | (0.292) | (0.394) |
| Idea poster 4 | -0.204 | 0.809 | 0.228 | 0.449 |
| | (0.344) | (0.566) | (0.295) | (0.385) |
| _cons | -4.013 | -6.605*** | -3.497*** | -2.763*** |
| _ | (0.731) | (1.333) | (0.621) | (0.892) |
| N | 1.945 | 898 | 1.945 | 898 |
| ll | -395.605 | -161.782 | -510.690 | -239.034 |
| LR chi2 | 120.61 | 74.43 | 131.96 | 79.87 |
| p | 0.000 | 0.000 | 0.000 | 0.000 |

*, **, *** indicate significance at 10, 5, and 1 percent level.

A significant effect is found for hold decisions ($\beta = 0.592$, $p < 0.05$) in the treatment group, while no significant effect is found for hierarchical endorsements in the control group ($\beta = -0.325$, $p > 0.1$). This indicates that hierarchy endorsements are associated with participant hold decisions. On the left-hand side of the table, we present logit regression models (model I-II) that estimate shift decisions. We find no significant effect for hierarchical endorsements when estimating shift decisions, not for the treatment or control group. These results altogether suggest that hierarchical endorsements mainly reinforce initial quality judgements of idea creators, rather than that they shift selection towards other ideas.

### 3.4.4 Supplementary Analysis

**The effect of hierarchical endorsements on different groups**. To test whether participants react and respond in a different manner to hierarchy endorsements as a function of their respective position within that hierarchy, we segregated the treated and non-treated participants into two split samples, one for high-hierarchical positioned organisational members, and one for low-hierarchical positioned organisational members. Table 26 reports regression results with idea *selected* as dependent variable. Models I-II report estimates for the high-hierarchy split sample, while models III-IV show results for the low-hierarchy split sample. For the treatment group, the share of high-hierarchy endorsements is significantly positive for the high-hierarchy participant subsample ($\beta = 0.975$, $p < 0.05$), while it is not for the low-hierarchy participant subsample ($\beta = 0.282$, $p > 0.10$). For the control group, the hierarchical endorsement variables remain insignificant in both subsamples. This means that hierarchical endorsements impact differently on persons that are in different positions in the organizational hierarchy, whereby only those high in hierarchy seem to react stronger to hierarchical endorsements.

Additionally, we have taken in consideration that student representatives, although formally being part of the education program organization, are replaced on a regular basis, typically when they graduate. We have therefore excluded the student representative subjects from our analyses, both for the main analyses as for the split sample analyses as an additional check. Our findings remain robust and stable. We decided to not exclude them in the reporting of our results, since this would not be truthful to their participation in the experiment and ideation day.

Table 26: Logit regressions between high-hierarchy and low-hierarchy split samples

| Logit regressions | Model I | Model II | Model III | Model IV |
|---|---|---|---|---|
| | Treatment group | Control group | Treatment group | Control group |
| | High hierarchy split sample | | Low hierarchy split sample | |
| *Idea selected (DV)* | | | | |
| Share of high-hierarchy endorsements | 0.975** | -0.046 | 0.282 | -1.003 |
| | (0.384) | (0.494) | (0.273) | (0.552) |
| Total endorsements | 0.285*** | 0.412*** | 0.307*** | 0.731*** |
| | (0.056) | (0.109) | (0.035) | (0.133) |
| N° of ideas | -0.017* | -0.019*** | -0.016** | -0.012* |
| | (0.009) | (0.007) | (0.006) | (0.007) |
| Idea value potential | -0.061 | 0.478** | 0.315** | 0.257 |
| | (0.189) | (0.213) | (0.129) | (0.232) |
| Idea feasibility | -0.145 | -0.327 | -0.070 | -0.064 |
| | (0.200) | (0.227) | (0.129) | (0.254) |
| Idea length | 0.016 | -0.003 | 0.004 | -0.001 |
| | (0.011) | (0.018) | (0.008) | (0.020) |
| Prior work experience | 0.023 | 0.099 | -0.316* | -0.166 |
| | (0.212) | (0.247) | (0.178) | (0.268) |
| Own idea | 0.733 | 0.358 | 1.852*** | 2.129*** |
| | (0.668) | (0.721) | (0.502) | (0.817) |
| High-hierarchy idea creator | 0.134 | 0.274 | 0.045** | 0.371 |
| | (0.348) | (0.355) | (0.215) | (0.472) |
| Poster Quadrant 1 | 0.088 | 0.398 | -0.025 | 0.000 |
| | (0.359) | (0.549) | (0.255) | (0.603) |
| Poster Quadrant 2 | 0.254 | 0.835 | 0.398 | 0.273 |
| | (0.359) | (0.571) | (0.255) | (0.619) |
| Poster Quadrant 3 | 0.207 | 0.688 | 0.207 | 0.372 |
| | (0.372) | (0.580) | (0.265) | (0.622) |
| Idea poster 1 | 0.772* | -0.135 | 0.441* | 0.890* |
| | (0.383) | (0.561) | (0.254) | (0.502) |
| Idea poster 2 | 0.245 | 0.765 | 0.135 | -0.111 |
| | (0.419) | (0.563) | (0.299) | (0.665) |
| Idea poster 3 | 0.054 | 0.871* | -0.085 | -0.044 |
| | (0.425) | (0.470) | (0.285) | (0.503) |
| Idea poster 4 | 0.168 | 0.782 | -0.063 | 0.580 |
| | (0.432) | (0.477) | (0.290) | (0.496) |
| _cons | -2.298 | -3.499*** | -3.338*** | -3.940*** |
| | (0.852) | (1.069) | (0.622) | (1.205) |
| N | 617 | 434 | 1.328 | 464 |
| ll | -192.302 | -160.007 | -468.679 | -140.789 |
| LR chi2 | 79.63 | 73.21 | 195.02 | 87.04 |
| p | 0.000 | 0.000 | 0.000 | 0.000 |

*, **, *** indicate significance at 10, 5, and 1 percent level.

## 3.5 Interpretations of the results

The findings of the natural field experiment highlight the differential effect of idea endorsements in function of the hierarchical position of the endorser, the hierarchical position of the endorsee, and the differential decision-mechanisms it is liable to trigger. In particular, we find that organizational members in high hierarchical positions are in particular liable to favour ideas that are endorsed by other members of the high-hierarchy group. It is worthwhile to acknowledge that these results may be due to the particular features of our setting, which is based at a research-intensive university. Although there is a clear hierarchical disparity within universities between professors, professional staff and students, as more than 85 percent of the participants pointed out in the post-experiment survey that professors are the group with the most decision authority, it is also the case that professors at the university operate under a different set of norms than other members of the organization. As members of the scientific community, professors work within the Mertonian norms of science. These norms may provide a powerful institutional logic that guides attitudes and behaviours of professors, which may not be shared with other members of the university community. As a result, professors may only assign value to the views of other members of their shared community (Simcoe & Waguespack, 2011), favouring those ideas endorsed by fellow members of this community.

The experimental procedure – through its research design and organizational setting - does rule out several alternative explanations for our results. First, participants are blinded to what person specifically is giving what endorsements. The participants do observe who is present in the other teams at the outset of the day (in the briefing presentation) but they do not know which teams exactly endorsed their ideas or what endorsement is coming from which individual. This rules out any individual perceptions about the identity of an endorser, giving information only on their hierarchical position. This in itself, should rule out power or status-based differences within the hierarchical layered groups (for instance between assistant professors and full professors). The finding that the high-hierarchy group of participants are most affected by high hierarchy endorsements might lead to the interpretation that we are picking up peer effects, yet then we should also observe this in the other groups of participants (students representatives & staff members), which we do not.

The proposed hypothesis that high-hierarchy endorsements would be favoured during idea selection is rooted in three core mechanisms: a) perception of high competence of high-hierarchy organizational actors, b) attest of future support to implement the idea and c) deference towards high-hierarchy members to influence oneself upwards.

Perceptions of competence likely corresponds with associated concepts such as the education, seniority and work experience of a person. Comparing the professor and staff members groups of the organization, we observe that professors on average are about ten years older in age, typically hold a higher degree (doctoral degree), whereas most staff members have a master's degree. Professors have on average been employed for a longer duration of time at the university, fifteen years compared to a mean of ten years of employment for staff members. Perceptions of higher competence for the professor group is therefore not unwarranted to be present in the organizational context of our research setting. In a similar vein, it is not unlikely that endorsements might be interpreted as signals of future support to implement the idea, since more than 85 percent of the participants indicated in the post-experiment survey that the professor group have the most authority in deciding what ideas will become implemented or not in the organization. Acts of deference to influence oneself upwards might be present in the experiment and organizational setting (for instance in the professor group), but it should be weakened since staff members cannot (easily) climb the hierarchical ladder to attain a high hierarchy position.

## 3.6 Chapter Discussion

As part of the idea journey, idea creators tend to seek out endorsements from their fellow organisational members in order to increase the likelihood for their idea to be supported, developed and integrated into the nuts and bolts of the innovation engine of the organization (Perry-Smith, 2006; Kijkuit & Van den Ende, 2007; Keum & See, 2017). As hierarchies are integrally embedded in most organisations, a discrepancy typically exists between members positioned at various levels within the organizational hierarchy - which essentially is a formal representation of the power and status that those persons have in the organisation (Brass & Burkhardt, 1993; Ibarra, 1993; Magee & Galinsky, 2008; Anderson & Brown, 2010). In this study, we examine how hierarchy influences the impact of endorsements on the decision-making process of organizational members to take up certain ideas, while

abandoning others. We expect persons to give more weight in their idea selection decisions to endorsements from colleagues in high hierarchical positions because they perceive such colleagues as being more competent and to be in positions of authority through which they can ensure that the idea will be realized and implemented. In addition, participants might engage in deference to high hierarchy members by favouring their endorsements during idea selection. In our examination of idea selection, we check whether hierarchical endorsements mainly cause hold or shift decisions during idea selection.

Through the application of a field experiment at a major European university organisation, we manipulated information on the hierarchical source of endorsements given to ideas generated by organizational members (professors – staff – student representatives). Our findings show that organizational members give a higher weight, when selecting ideas, to endorsements by persons in high hierarchical decisions. In further investigation how the idea selection decisions are affected by hierarchical endorsements, we find that high-hierarchical endorsements influence idea selection decisions mainly through confirming persons initial judgements, e.g. hold decisions.

This research suffers from a number of limitations that also provide scope for future research. First, the fact that our field experiment was conducted at a single organizational context limits the generalizability of our findings. The subjects are part of a suborganization of the faculty of economics and business at the university that manages the education programs. Since we were interested in the effect of hierarchical endorsements in a real-world and meaningful context, it was necessary to focus on a single organization context where the authors could have direct influence on the design of the ideation event to conduct the experiment. The procedure of the idea generation and selection process was modelled on prior experience and extant studies on brainstorming studies (Wooten & Ulrich, 2017; Keum & See, 2017) with clear instructions to the participants (see appendix 2 for brainstorm instructions). However, future research could explore other contexts or on-line settings, using a similar method of sticker manipulation for hierarchical endorsement.

Second, our experiment relies on a subtle and simple treatment, altering the colour of stickers by hierarchical level between the treatment and control groups. This treatment was designed to have minimal interference with the ideation process. However, the use of such a modest treatment means our results are liable to be highly conservative in the assessment of hierarchical endorsements. More

significant and targeted treatments might provoke stronger reactions by participants to hierarchical endorsement or might have a more persistent, long-term effect on the innovation process. Future research should therefore seek to develop stronger and potentially more effective treatments to expose hierarchical endorsement effects. This could be done by assigning votes to senior decision-makers prior to idea selection or by using verbal cues, such as statements by senior decision-makers about ideas, to elicit the emotive responses to hierarchical endorsement by participants.

Third, it is clear that the preferences of individuals are liable to be strongly influenced by exposure to information about the preferences of others due to preferential attachment. In our study, voting was carried out in two waves by different groups. However, it may be the case that the early votes towards some ideas conditioned the later votes for these same ideas. Although such preferential voting patterns were equally liable to be present in both the treatment and control groups of our sample, it may be that exposure to information of the endorsements of others crowds out the effect of hierarchical endorsement in our treatment population, further reducing the potency of our treatment and potentially leading to an underestimation of hierarchical effects. Research designs that force participants to vote in secret ballots where equal numbers of votes assigned to each idea and hierarchical endorsement randomly assigned might help to overcome this limitation of our study.

Fourth, at this point we cannot disentangle exactly which of the three mechanisms (perceptions of competence, attest of future support, acts of deference) mainly drive our results. Future research could investigate this further by setting up vignette studies where the three mechanisms are separated by carefully constructing various distinctive descriptions of a high-hierarchy endorser, the relationship between the participant and the high-hierarchy endorser and the situation.

Lastly, our focus on the university as the site for our field experiment raises concerns about the external validity of our findings. The context of our study, a research-intensive university is not representative for a linear hierarchical structured or more ‘command and control’ type of organizations. Yet, we do want to relax this concern to some extent as it must be said that many professional services firms, R&D labs and other creative environments operate as professional adhocracies on similar organizational design principles as universities, offering individuals a degree of autonomy in their work (Von Nordenflycht et al., 2005). In addition, universities’ education activities themselves involve a set

of complex operations, including dealing with student applications, timetabling, assessment, housing, alumni relations, etc., each of which have a wide range of professional staff and stakeholders inside and outside the university. As such, these education activities are similar to the challenges faced in private firms and other public organizations who deal with complex operational tasks, delivering large volumes of personal services to a range of ‘customers. Increasingly, universities are under pressure to demonstrate their care and attention to needs and views of their students, and therefore have become more ‘business-like’ and customer-oriented in their operations.

Despite these important limitations, this study has sought to bring new insights and evidence into how hierarchical endorsements shape idea selection, drawing upon a rich field experiment and a subtle yet potent treatment. We hope this approach will spur further research on how hierarchy shapes the idea journey within and across organizations.

**Exhibit 1: Schedule and flow of the natural field experiment**

| Time | Activity participants | Coordinator tasks |
|---|---|---|
| 8:00 | | - Coordinator A & C: pick-up idea generation material (post-it's, stickers, posters) at CPR<br>- Coordinator B & D: go to auditorium – prepare and test slides for briefing presentation |
| 08:15 – 09:30 | | - Coordinator A & C: prepare brainstorm material in each breakout and at the reception desk in Building A (treatment)<br>- Coordinator E & F: prepare brainstorm material in each breakout and at the reception desk in Building B (control)<br><br>Preparing material in breakouts<br><br>• Add the team number + list of team members to the assigned breakout<br>• Hang up the five idea posters in each breakout room<br>• Put down writing material in each breakout room<br>• Rearrange tables (if necessary)<br>• In the hallway, position a chair and table for each coordinator, with an overview of the breakouts and room to store material<br><br>Preparing reception desk<br><br>• Coordinator A: prepare reception desk (name tags, post-its, stickers) in Building A<br>• Coordinator E: prepare reception desk (name tags, post-its, stickers) in Building B |
| 08:30 – 09:30 | | - Coordinator C: bring coffee to the middle floor in building A + hang up arrows pointing teams to their breakouts at the stairs<br>- Coordinator E: bring coffee to the middle floor in building B + hang up arrows pointing teams to their breakouts at the stairs |
| 09:00 – 09.50 | General assembly briefing in the auditorium | - Coordinator B: guide participants to Building B<br>- Coordinator D: guide participants to Building A<br>- Coordinator A & B: final check of the reception desk<br>Name tags laid out per education program committee and per hierarchical rank (professor, staff, student representative) |
| 09:50 – 10:10 | Participants arrive at Building A and Building B | At building A:<br><br>- Coordinator C: stand-by at the doors to guide participants to reception desk<br>- Coordinator D: standby at the stairs to direct participants<br>- Coordinator A, C, H : reception desk – distribute material<br>• Welcome each participant individually<br>• Ask for name, committee & title<br>• Hand over their specific material<br>• Emphasize the colour is linked to their title<br>o Blue = professor<br>o Green = staff member |

| | | |
|---|---|---|
| | | o Yellow = student representative<br>• Emphasize that each person is expected to work with their assigned material. That way the idea generation output is traceable for later follow-up.<br><br>At building B:<br><br>- Coordinator F: standby at the stairs to direct participants<br>- Coordinator B & E: reception desk – distribute material<br>• Welcome each participant individually<br>• Ask for name, committee & title<br>• Hand over their specific material<br>• Emphasize that each person is expected to work with their assigned material. That way the idea generation output is traceable for later follow-up. |
| 10:00 – 10:15 | Participants move to breakout and fill in the 'attendees-list document' which also recaps the challenges of the idea generation and the brainstorm instructions. | At building A:<br><br>- Coordinator I: move to second floor and indicate to teams that they can start brainstorming.<br>- Coordinator D: move to third floor and indicate to teams that they can start brainstorming.<br>- Coordinator C: move to fourth floor and indicate to teams that they can start brainstorming. Coordinator H – move to fourth floor to assist (most teams)<br>- Coordinator A: make sure everyone has their assigned material + help participants to find the right break-out – keep overview<br><br>At building B:<br><br>- Coordinator E: move to second floor and indicate to teams that they can start brainstorming.<br>- Coordinator F: move to third floor and indicate to teams that they can start brainstorming.<br>- Coordinator B: make sure everyone has their assigned material + help participants to find the right break-out – keep overview |
| 10:15 – 11:40 | Idea generation<br>- Brainstorm instruction are on the document in break-out<br>- Five posters are hanging to post ideas on with (large) post-its | - Enter break-out of assigned floor and check:<br>• Have you found and read the brainstorm instructions?<br>• Everything clear?<br>• Can you move forward with this information?<br>• Use own post-it's: that way we can contact you after the strategic idea generation day in case there are more questions about your ideas.<br>• Take about 15min per idea challenge: make sure that ideas are generated for each idea challenge.<br>- Check-up during the idea generation that groups progress from one challenge to the other. Be visibly available at all times for questions. |
| 11:40 – 11:50 | First evaluation of ideas | - Enter breakout and announce that time is up<br>- Hand out 1st idea evaluation document (by name)<br>o Emphasize to fill in document individually |

| | | |
|---|---|---|
| | | o Ask the participants to list in order the six best ideas that address the challenge<br>o Ask each participant to put the document faced down when they are finished<br>- Explain the next step: endorsement rounds<br>o Each group will rotate to two other break-outs<br>o Use the stickers to endorse the ideas that you find the best and that addresses the challenges.<br>o Everyone takes and uses their own stickers<br>o Emphasize to use 1 endorsement sticker per idea<br>o 11.50 – 12.00: first rotation<br>o 12.00 – 12.10: second rotation<br>o 12:10 → return to own breakout<br>o The timing of the endorsement rounds is crucial, make sure that teams rotate in time and together. No loitering in the breakouts or hallways.<br>o Coordinator A & B align start, rotation and end of endorsement rounds via the WhatsApp group |
| 11:50 – 12:15 | Endorsement rounds | - Pick up first evaluation documents in each breakout<br>- Keep track of the rotating groups and the timing of rotation<br>o 11.50 – 12.00: first rotation<br>o 12.00 – 12.10: second rotation<br>o 12.10 – 12.15: back to own break-out |
| 12:15 – 12:25 | Second evaluation of ideas (idea selection) | - Hand out final idea selection document (by name)<br>• Ask participants to again check the posters and the ideas, now that they were endorsed by the other groups<br>• Ask the participants to list (in order) the six best ideas that address the challenge on the evaluation document<br>• Same process as before |
| 12:25 – 12:35 | Filling in survey | - Hand-out post-experiment survey<br>• Collect second evaluation sheets<br>• Ask participants to leave the posters and ideas on the walls – the coordinator team will collect them later<br>• Distribute post-survey – ask them to fill it in individually<br>• Ask participants to hand over the post-survey before going to lunch |
| 12.35 – 13.00 | Handing in final documents and move to the lunch area | - Coordinator D, C, I: gather surveys from all teams on your floor in building A<br>- Coordinator E & F: gather surveys from all teams on your floor in building B<br>- Coordinator A & H: document idea generation output<br>o take pictures of all idea posters<br>o tape the post-its to the posters using tape<br>o remove posters with post-it's attached from the walls and bring them to the research coordinator office<br>- Other coordinators guide participants to the lunch area |

**Exhibit 2: Brainstorm guidelines and instruction document**

# Idea generation guidelines – Team {Education Program X}

Welcome to your brainstorm break-out!

**Before you start generating ideas:** please write down the names of the present team members.

1……..  2…….

3 ……..  4……..

In case a team member is missing, please notify your floor coordinator. Please do double-check as well if everyone has their own stack of post-it notes and stickers.

**Time to generate ideas!**

Some guidelines and playing rules:

- Brainstorm individually. Write down your ideas and place them on the idea poster.
- Be concrete in the description of your idea.
- Think outside the box! Go for originality and impact
- When you placed the post-it notes on the wall, explain the idea (briefly) to your team members
- Do not criticize or comment on each other's ideas. We want to go for as many ideas as possible.
- The more ideas, the better!

Brainstorm per idea challenge in the order prescribed below. Spend about 15 minutes per idea poster. A recap of the idea challenges can be found in your document.

1. Idea challenge 1 (10.30-10.45)
2. Idea challenge 2 (10.45-11.00)
3. Idea challenge 3 (11.00-11.15)
4. Idea challenge 4 (11.15-11.30)
5. Idea challenge 5 (11.30-11.45)

**Done with the brainstorm?** If you have brainstormed on all five idea challenge posters, please wait in your room. The coordinator will be with you to brief you on the next steps.

**Exhibit 3: Post-experiment survey**

Dear participant,

Foremost, thank you for generating and developing ideas during our strategic ideation day. The ideas that you selected will be further elaborated upon during the afternoon. All the generated ideas will be collected from the idea posters and stored for further use during the academic year.

Further, we want to ask your permission to use the generated idea-related information for a research project that focuses on the role of endorsements during idea selection.

☐ I consent for my data to be used for research purposes.

In addition, we would like to ask you some final questions:

A. Please indicate with whom of your team members today you collaborate frequently. (0 = not, 1 = sometimes, 2 = frequently).

| | | | |
|---|---|---|---|
| ..... | | ..... | |
| ..... | | ..... | |

B. According to you, what is the meaning of the colours of the stickers (blue, green, yellow) that were used to endorse ideas?

.....

.....

.....

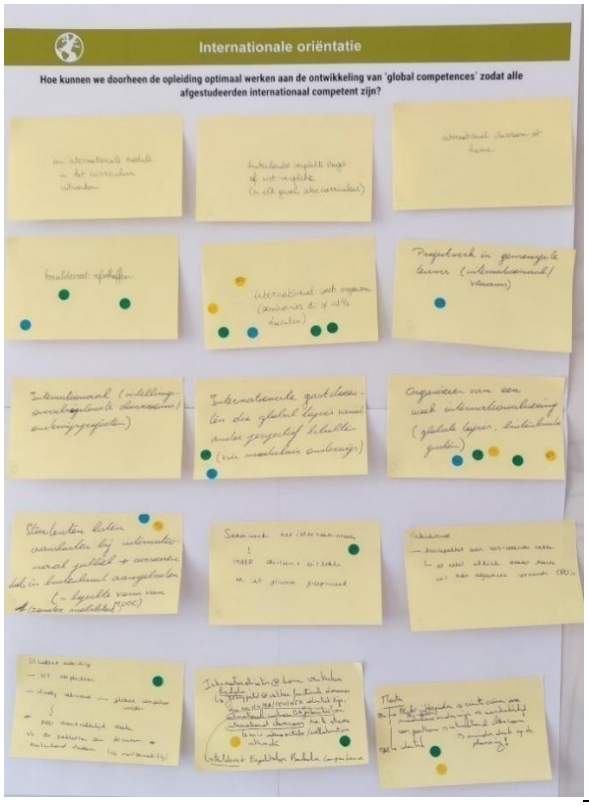
.....

.....

C. Which group has the largest voice in terms of deciding what ideas will be selected and further developed? (Please indicate below).

| | | | | | |
|---|---|---|---|---|---|
| | **Professors** | | **Academic staff** | | **Student representatives** |

**Exhibit 4: Idea poster with endorsement stickers**




**Treatment group**


**Control group**

# General Conclusion

This dissertation makes several contributes to the emerging stream of research studies on idea contests and the innovation front end literature in several ways. Firstly, while it was strongly advocated that idea contests should be carefully organized or designed in order to yield successful outcomes (Terwiesch & Ulrich, 2009; Dahlander et al., 2019; Nicolajsen et al., 2019), the limited availability and comparability of idea contests over multiple organizations has halted innovation scholars to provide evidence on how various set-ups or designs of idea contests could improve or lower front end or idea generation performance.

To shed light on this issue, this thesis starts off with an explorative investigation of thirty-seven idea contests organized on the Yambla idea management software platform, mapping their design configuration and linking those with the level of idea suggestions that flow into the innovation process (idea quantity) to uncover dominant archetypes of high and low idea generating idea contests. Secondly, while the majority of the innovation front end literature emphasizes idea generation and selection, the emphasis is shifted in the second chapter of the dissertation towards idea development and questions how feedback could affect the development of ideas during multi-staged idea contests organized between 2014-2016 at Accenture Belux. In the third chapter, I focus the attention on the selection of ideas during an idea contest. In particular, the study sheds light on how endorsements can affect the take-up of ideas and in particular whether the hierarchical rank of an endorser can affect participants' decisions to select an idea by confirming their initial judgement about the value of ideas or by shifting their attention to previously unconsidered ideas. This conjecture is tested using a field experiment at the education suborganisation of the Faculty of Economics and Business at the KU Leuven, where information about the hierarchical endorsement on ideas is exposed and withheld to a randomly assigned treatment and control group involved in an idea contest process.

The overarching contribution of this dissertation therefore aspired to create understanding on how idea contests can be improved in terms of idea generation, development and selection. In the next

sections, I summarize the main findings, discuss the theoretical and managerial implications and I outline the limitations of the research in this thesis. To close-off the thesis, I list several opportunities for future research.

# I. Main findings

Chapter 1 starts with an overview of idea contest design elements as identified in the extant literature and exploratively investigates what configuration of idea contests succeeds or fails to generate many ideas, based on the firms that used the Yambla idea management platform in support of their idea contests. Derived from the fs-QCA results, we suggest that idea contests that a) combine broad call for ideas with administrator feedback and b) that at least have either a temporary idea sharing period, considerable promotional communication at the launch of the contest or rewards to attract participants in place are sufficient conditions to result in high levels of idea suggestions (idea quantity). The idea contest designs that failed to generate many ideas from their potential pool of idea contributors are shown to be the cases where there is no promotional communication established at the launch of the idea contest and where there is either no broad call for ideas or no administrator feedback team in place. Rewards, whether pecuniary or non-pecuniary have a less straight-forward relationship with idea generation than was initially expected. As such, this chapter exploratively puts several suggestions on how to design idea contests in order to stimulate higher input levels of idea generation or avoiding the breakdown of not having enough ideas to work with (Nicolajsen et al., 2019).

Chapter 2 zooms in on the role of feedback interactions during the idea contest process. The study shifts the focus from idea generation to idea development by investigating how the early conceptual development of ideas is differently affected by the nature of the feedback, the repetition of feedback and the feedback provider and recipient characteristics. Feedback with developmental content (directive feedback) is found to have a general positive effect on idea development. This effect is strengthened if different people provide similar feedback. No significant positive effect is found for feedback without developmental feedback, that only encourages (motivational feedback), except when the employees receiving the feedback occupy low hierarchical positions in the organization. While evidence shows that the effect of feedback is moderated by the hierarchical rank of feedback recipients, similar evidence

of moderation effects in function of the hierarchical rank of feedback providers is not found. The results of this study generate new insights for innovation managers under what conditions feedback can effectively be used to stimulate idea development in the front end of the innovation process.

Chapter 3 examines how idea selection decision are shaped by endorsements given during the idea creation process, and in particular whether the hierarchical position of the endorser alters the tendency for selecting certain (endorsed) ideas. A general tendency for selecting ideas that receive high-hierarchy endorsements is found. Furthermore, we find that high-hierarchy endorsements mainly reinforce initial quality judgements of organizational actors, rather than that they shift selection towards other ideas. Finally, whereas the extant theory on organizational hierarchy predicts a cascading relation between high-hierarchy and low-hierarchy members, the findings demonstrate that high-hierarchy endorsements significantly influence the idea selection decision of the high-hierarchical positioned actors.

# II. Theoretical Implications

The findings in this thesis offer important contributions & implications for the extant innovation management literature. First, through the systematic exploration of multiple real-life organized idea contests, the findings indicate that no single design element of idea contests will lead to success or failure in generating many ideas by itself, only in conjunction (Misangyi & Acharya, 2014; Ordanini et al., 2014). While the majority of prior research studies of idea contests tend to focus on investigating a single case or one design element in isolation, the results of this thesis seem to reinforce the conceptual framework of Dahlander et al., (2019) by exploratively testing interdependencies between different phases of the crowdsourcing process (Levinthal, 1997; Rivkin & Siggelkow, 2003). This thesis presents suggestive evidence that an interplay exists between several design elements, and that they jointly can shape the amount of idea suggestions flowing into the idea contest. Future research studies on idea contests are therefore encouraged to take stock of the interdependency between different design elements of idea contest and the different phases of organizing crowdsourcing.

Feedback has been suggested in extant front end literature (Wooten & Ulrich, 2017; Beretta, 2019; Piezunka & Dahlander, 2019; Zhu et al., 2019) to be a potent instrument for stimulating idea generation and selection during the front end of the innovation process. The examination of feedback interactions

during idea contests in this thesis aligns with this suggestion and contributes to it by highlighting under what conditions feedback can positively stimulate idea development, elaboration and enrichment. In particular, we show under what conditions feedback is most effective in stimulating idea development, leading to higher relative idea quality (Wooten & Ulrich, 2017; Zhu et al., 2019).

This finding underscore and extend the statement of Terwiesch & Ulrich (2009) that certain ideas need '*time to shine*.' Therefore, the thesis makes a case for idea contests, and the innovation front end in its extension, to be set up in a way to give sufficient time for ideas to become iteratively challenged and refined. By doing so, this dissertation joins a group of managerial scholars who acknowledge that innovation processes should not be rushed, rather given time (Brown & Eisenhardt, 1995; Van de Ven et al., 1999; Garud et al., 2011; Lifshitz-Assaf, Lebovitz & Zalmanson, 2020), and that the earliest stage of the innovation process is not exempted from this rule (Griffith-Hemans & Grover, 2006; Elmquist & Segrestin, 2007; Kijkuit & Van den Ende, 2007; Floren & Frishammar, 2012; Bergendahl & Magnusson, 2015; Perry-Smith & Manucci, 2017). Furthermore, we shed light on the effectiveness of repetition of (directive) feedback, which is a seemingly unexplored aspect of feedback theory (Nadler, 1979; Oldham & Cummings, 1996; Zhou, 2008; Ashford & De Stobbeleir, 2016) by demonstrating a positive effect of feedback text similarity on the development of ideas.

Another theoretical implication of this thesis relates to the hierarchical component of interactions between employees during idea contests. Since idea contests do not take place in a social vacuum, this thesis demonstrates how the idea creation process can be affected by the organizational hierarchical disparity between employees within an organization. The thesis reports twice how the hierarchical disparity between organizational members affects the idea creation process during idea contests: 1) it highlights how the hierarchical rank of feedback providers and recipients can affect the relation between feedback and idea development and 2) it shows that the hierarchical rank of an endorsement can affect idea selection decisions. A generally accepted assumption made in the organizational literature is that employees will give more weight or defer in an upward fashion from low-hierarchy to high-hierarchy organizational members (Fragele et al., 2012; Joshi & Knight, 2015; Keum & See, 2017; Stiles et al., 2017). The directional expectations suggested in the extant theory on hierarchy in organizations (Gavetti, 2005; Van der Vegt et al., 2010; Powell, et al., 2011; Reitzig & Maciejovsky, 2015; Keum &

See, 2017) are based on three mechanisms: (1) the (perceived) higher competence and expertise of high-hierarchy organizational members, (2) the potential future support or championing of ideas by the high-hierarchy organizational members and (3) the deference towards high-hierarchy members to advance upwards yourself in the organizational structure.

The findings of the second and third chapter in this thesis demonstrate that this relationship is not so straight-forward. The study in chapter 2 indicates that idea owners positioned lower in the hierarchy are positively stimulated by the feedback received when developing their ideas. Yet, simultaneously, feedback given by someone with a high-hierarchical rank is not found to disproportionally affect the development and enrichment of ideas. This seems to suggest that low hierarchy employees are more prone to listen and internalize feedback during the development of ideas, regardless of the hierarchical rank of the feedback provider. In our investigation of the idea selection decisions of idea contest participants in chapter 3, a dissimilar effect of hierarchy is found. The findings presented in the field experimental study imply that high hierarchical organizational members tend to favour and select ideas that are endorsed by other members who hold a high-hierarchical rank in the organization, while those positioned in the lower ranks of the hierarchy are not found to be influenced by the hierarchical nature of endorsements. This finding largely suggests that high-hierarchy organizational members might make 'social inferences' based on the endorsement of their fellows, with whom they identify based on their shared high-hierarchical rank in the organization (Manski, 1993; Hogg et al., 1995; Fini et al., 2018), although we do not find a peer effect for the low hierarchy groups. From a theoretical perspective, these findings therefore suggest a more complex relationship between hierarchical dispersed organizational members in the idea creation process.

# III. Managerial Implications

From a managerial perspective, the findings in this thesis offer important insights & implications for practitioners, and in particular for managers in charge of setting up idea contests or managing the front end of the innovation process in their organization.

Achieving success when organizing crowdsourcing via idea contests can be a tour de force (Nicolajsen et al., 2019; Dahlander & Piezunka, 2020; Porter et al., 2020). Many pitfalls exist that can

cause an idea contest to fail in the innovation front end, such as receiving too few idea suggestions from the crowd or receiving idea suggestions from only a few people in the large pool of potential idea contributors, thus limiting the diversity of suggested ideas. Moreover, even if plenty idea suggestions are solicited from the crowd, ideas might lack decent initial quality or originality, or they might not become further elaborated or enriched enough by the idea contributors, resulting in poor or mediocre quality at the end of the idea contest. A final pitfall relates to idea selection, where the evaluation procedure can fail to filter out and select the most promising ideas from the pool of suggested ideas if not managed carefully, or by selecting ideas that are not endorsed by the organization, and therefore will likely not be adopted and implemented by the organization (Katz & Allen, 1982; Hannen et al., 2019). Even with the best of intension, an organizer of idea contests cannot control or force how the crowd will respond or behave during an idea contest (Dahlander et al., 2019; Nicolajsen et al., 2019), which makes matters even more complicated.

What an organizer can do to achieve higher front end performance, however, is to meticulously plan or design the set-up of the idea contest so that it entices the crowd to suggest many, diverse ideas, to support and encourage the development of the suggested ideas and to identify the most promising ideas from this pool (Terwiesch & Ulrich, 2009; Girotra et al., 2010). This thesis compiles several suggestions on how organizers can approach the organizing or designing of an idea contest to increase the odds of achieving better front end performance.

## IIIa. How to stimulate idea generation

First and foremost, the results of the comparative investigation of thirty-seven idea contests imply that it can pay off for idea contest organizers to think about different design elements of idea contests in union or as configurations. The examination of idea contest design variations suggest that it is ill-advised to rely on one idea contest design element in isolation to realistically end up with a high amount of idea suggestions by the crowd of potential idea contributors. The findings show that idea contests that performed consistently well in soliciting many idea suggestions were those contests that combined several idea contest design elements together. The idea contests that consistently failed at soliciting many idea suggestions from the crowd are shown to be those idea contests that only implemented design elements in just one of the three phases (formulate – broadcast – select), which therefore reinforces the

suggestion of Dahlander et al. (2019) that each phase of the crowdsourcing process are interconnected and builds on one another.

In particular, the results suggest that it is favourable for idea generation performance to use broad, unrestricted call for ideas when defining or scoping the search for ideas – certainly when it is combined with an administrator or administrator team in place that proactively provides feedback to each suggested idea. Since one of the prime motives of idea contestants to participate is to acquire new knowledge, experience and skills (Leimeister et al., 2009), feedback is therefore brought forward as a potentially effective instrument to accommodate sharing of information, knowledge and to evoke learning opportunities for idea contest participants. Furthermore, not having the combination of a broad call for ideas and an administrator feedback team in place, is suggested to be unfavourable for idea generation, especially if on top of that, there is also a lack of promotional communication to broadcast the idea contest (Nicolajsen et al., 2019; Porter et al., 2020).

## IIIb. How to stimulate idea development

Besides generating more idea suggestions, the inherent quality of ideas has been shown in the thesis to evolve significantly throughout early idea development and refinement in function of feedback accumulated. A conventional myth often expressed by entrepreneurs and innovators is that "*it is not the idea that matters, but the execution and the team that executes the idea*." The research presented in this thesis on idea development and elaboration during idea contests attests that this expression is not fully correct, as we found that the raw idea suggestions that are already novel at the start of the idea contest, all other things equal, are more likely to grow and outperform the other ideas in the idea contest. As such, the findings in this thesis understate that the novelty or originality of an idea, at its conception, already serves as a predictor of innovation success. Yet, a similar effect is not found for the other criteria that pertain to idea quality such as the ideas' feasibility, value potential and specificity (Dean et al., 2006). Therefore, claiming that the development and execution efforts, or the team behind these activities, do not matter at all would also be untruthful. Taken together, we suggest that it is the *conjunctive conversion* of early, preliminary ideas into fully corroborated innovative products, services or technologies that will eventually affect its outcome and realised impact (Goldenberg et al., 2001; Kornish & Ulrich, 2011; Mollick, 2012), although having an idea that is inherently *original* at the start

of the front end process will not hurt the chance of success either (Kornish & Ulrich, 2011). Said differently, it is each step of development in the innovation process (the marketing, the business model, the product development, the team, the execution but also the raw idea itself) that will jointly result in transforming an idea into a successful innovation (West, 2002). Our study on idea development adds the early conceptual development and refinement of ideas and the accumulation and internalization of developmental feedback to this list as drivers of an idea's journey towards innovation success.

To evoke the early development of ideas, feedback is brought forward in this thesis as a valuable instrument to positively stimulate idea development, leading to higher relative idea quality (Wooten & Ulrich, 2017; Zhu et al., 2019). The thesis suggest that feedback can stimulate the early development, elaboration and enrichment of ideas, if the feedback holds *developmental content*, suggesting practitioners to encourage communication of directive feedback as much as possible during idea contests, even when it repeats previously communicated feedback. In terms of motivational feedback, the findings provided in this thesis at first seem to suggest that simply liking or cheering on an idea or team may be interpreted as 'cheap talk' instead of actually actively supporting the idea through developmental feedback (Perry-Smith & Manucci, 2017; Hofstetter et al., 2020). Yet, our findings indicate that feedback without developmental content (motivational feedback) can give a positive stimulus to those employees who are positioned in the lower echelons of the organizational hierarchy to exert more effort in the development of their ideas. Directive feedback is shown to positively affect idea development regardless of the hierarchical rank the feedback provider has. We therefore recommend organizational members of any hierarchical rank to voice their knowledge and expertise, in the form of directive feedback, to their peers, subordinates and supervisors, as it can contribute valuable information that can direct employees to develop and elaborate their ideas to a higher quality.

## IIIc. How to organize idea selection

Since idea quality is shown to evolve over time, we argue against making a permanent selection of what ideas to develop and what ideas to reject at the very outset of the idea contest (e.g. one-off idea contests). Some ideas might not yet have shown their 'true' value or potential, not until they have been given more time to be further developed, refined or elaborated. A more prudent approach recommended to practitioners would be to challenge ideas by forcing them to go through multiple evaluation gates or

rounds, while supporting them simultaneously with continuous feedback aimed at directing and reinforcing the development, elaboration and refinement of ideas between each evaluation gate. Through taking stock of the progress of ideas in the multi-rounds' evaluation procedure, an organizer can track the initially promising-looking ideas, as well as the ideas that evolve considerably over time. At the same time, the organizer can gradually eliminate the ideas of lesser quality or the ideas that are not being further elaborated or refined.

In terms of idea selection, this thesis suggests that relatively little is known about how individual members of an organisation affect each other during the selection of ideas (Van der Vegt et al., 2010; Reitzig & Maciejovsky, 2015; Keum & See, 2017; Perry-Smith & Manucci, 2017), and in particular how hierarchical differences between organizational members can shape the eventual choice of what ideas will (never) see the light of the day. The experimental inquiry of the influence of (hierarchical) endorsements on idea selection in this thesis establishes, by and large, that employees' valuations of ideas are affected by idea endorsement of others in the organization during the front end process. Furthermore, it demonstrates that the hierarchical position of endorsers can shape idea selection decisions, predominantly through evoking hold decisions about earlier judgements or valuations of an idea. Even with relatively subtle signals of hierarchical rank, employees are shown to react differently to hierarchical endorsement received when making decisions what ideas to take forward and which to reject.

The findings of this study might - at first sight - cause concerns for herding behaviour or groupthink during the selection of ideas (Manski, 1993; Fini et al., 2018). I argue contrariwise, however, that the use of endorsements could relatively benefit idea selection a lot more than hurt it, due to two fundamental reasons. First, receiving endorsement from a diverse group of actors who hold dispersed knowledge, expertise and information, as they are positioned a various locations in the organizational structure (Nelson & Winters, 1982; Frederickson, 1986; Shane, 2000), can likely help to reduce the extreme uncertainty surrounding the future potential and development of ideas, thus likely improving decision accuracy of idea selection (Laroche, 1995; Bonaccio & Dalal, 2006; Klingebiel & De Meyer, 2013). Considering the endorsements of those organizational actors who have accumulated relatively more knowledge and expertise over time and who have overcome certain performance hurdles to attain

their high hierarchical positions (Eibl-Eibesfeldt, 1989; Campbell et al., 2012; Ashforth & Schinoff, 2016) might therefore not be the most unwise thing to do when determining which ideas should be selected for development and implementation. Secondly, it is a general notion in the organizational literature that an idea should gain social approval and acceptance from its organizational members, before it will be deemed valuable and be adopted by the organization (Simonton, 1989; Kijkuit & Van den Ende, 2007). Endorsements could therefore serve as an effective means to probe whether an idea will be deemed valuable by others in the organization. This holds true for hierarchical endorsements in particular, as they signal that the organizational members who hold authoritative power and influence over the organizational activities and processes, will likely support the idea.

In sum, I hope that the findings and insights of this thesis can be used by practitioners in order to (a) make better informed design choices when setting up idea contests in their organization to yield more idea suggestions, (b) support and stimulate the early development and refinement of ideas in the innovation front end and (c) better understand how the organizational hierarchical context can affect the valuation of ideas and the consecutive selection decisions of what ideas to develop.

# IV. Limitations

The research reported in this dissertation has important limitations that need to be pointed out. First, the research in this thesis is restricted to drawing inferences on idea contest design in relation to innovation front end performance. The ultimate (market) success of ideas, and how those are linked to idea contest design, therefore fall out of the scope of this thesis. Even more, we were not able to capture for each study the full spectrum of front end performance, e.g. the quantity of ideas generated, the average quality of ideas generated, the quality of the best ideas and the ability to discern idea quality (Girotra et al., 2010; Kornish & Ulrich, 2011). The three studies in this thesis therefore investigate, chapter-by-chapter, a different aspect of the front end (idea generation, development, selection).

Secondly, in this thesis, the main emphasis has centred on the use of idea contests as vehicles for idea generation, development and selection. Yet, firms use idea contests not only for filling their innovation pipelines, but also for other, often complementary objectives (Nicolajsen et al., 2019) which can be related to human resource strategy, knowledge management, and marketing. First, idea contests

are regularly used to develop the human resource capabilities of the firm, by stimulating employees to acquire and gain knowledge, skills and expertise related to transforming ideas into new products, services or new business ventures. Another human resource objective for which idea contests can be used is to support and reinforce an entrepreneurial or innovative culture in the organization (Schepers et al., 1999).

Thirdly, idea contests also serve as platforms where firms can capture and manage knowledge in the organization by fostering knowledge sharing and intra-organizational learning between the organizational members (Erickson et al., 2012; Majchrzak & Malhotra, 2017). Finally, the intention for a firm to organize an idea contest can also simply be to obtain an image or brand perception of being an innovative-invested company. This thesis is therefore limited to a certain extent as it focuses primarily on the success of idea contests in terms of innovation front end performance, while idea contests are (also) used to accomplish other strategic objectives.

Finally, a restriction to the research encompassed in this dissertation is that the findings are largely dependent on the organizational context wherein the idea contest has taken place. Whereas the first and second study report on idea contests in for-profit firms, the third study reports on an idea contest process at a public, non-profit organization. The results of each chapter might therefore strongly be driven by the organizational context wherein they take place (Perry-Smith, 2006; Van der Vegt et al., 2010, Tzabbar & Vestal, 2015). Feedback for instance might be more salient in profit-firms than non-profit firms because of the competitive and disciplining force of the market. In a similar vein, pecuniary rewards might be more prominent in for-profit firms, whereas social recognition rewards may be more appreciated in academic institutions. Yet, while the diverse contextualized research settings restrict the generalizability of the findings to other organizational actors to a certain extent, it is worthwhile to point out that the research conducted and the findings uncovered in this thesis are based on real-life data, people and organizations, which improved our ability to provide detailed descriptions of the phenomena and contexts under investigation in our research settings (King et al., 1993). Even so, it is regrettable that all the three studies did not occur in the same type of organization as this would have allowed the thesis to have achieved not only data triangulation, but methodological triangulation (Creswell, 2003;

Harwell, 2011; Yin, 2017) – which could have further reinforced the mixed method research strategy used in this thesis.

Notwithstanding these important limitations, this thesis endeavoured to bring new insights to the innovation front end literature by applying a blend of methodologies on several different, yet rich datasets of real-life idea contests. I hope that this dissertation advances the managerial understanding on how idea contests can be better designed and managed to uncover and yield promising ideas, as well as spurring further academic research.

# V. Future research

To close off the thesis, several fruitful avenues for further research are outlined. First of all, the thesis pleads for more studies that compares idea contests, investigating how they vary in their set-up or design, and how different designs can lead to higher or lower innovation performance. While it is certainly my hope that the exploration of idea contest design variations in this thesis provide a new perspective to studying idea contests, further research is still needed to explore and test the interdependencies between idea contest design elements and firm performance. One possible fruitful investigation would be to explore the heterogeneity of firm's objectives when organizing idea contests. Idea contests are used to attain multiple, diverse strategic objectives (inflow of ideas in the innovation process, human resource capability development, knowledge management, sustaining and stimulating an innovative work culture and creating an innovation image or brand of the firm). Therefore, it would be interesting to investigate in future research endeavours how idea contest design is used to serve and attain different (combinations of) strategic objectives.

Secondly, in the investigation of the role of feedback on idea development, preliminary evidence is found on the effectiveness of repetition of feedback. In the extant literature on organizational feedback, relatively few assumptions are made, and those seem to argue both in favour and against the effectiveness of repeating feedback. As such, whether feedback repetition might show a reinforcing effect (feedback persistency) or a weakening effect (feedback redundancy) on an organizational actor is currently unclear and could therefore worthwhile to investigate further.

Thirdly, in our natural field experimental study, we were unable to disentangle what mechanisms explicate why high hierarchical endorsements are favoured when selecting ideas. Future research could investigate this further by setting up vignette studies where the mechanisms underlying the relationship between hierarchical endorsements and idea selection are directly modelled or manipulated.

Finally, the quantitative research applied in this thesis has incorporated quality controls confirm the creativity literature (Amabile, 1996; Dean et al., 2006) to check for idea quality in terms of its originality, value potential and feasibility. Yet, we did not incorporate the actual content of ideas as parameters of interest in the research. Further research might benefit from applying 'text and semantic analysis' to deepen the unit of analysis towards investigating the qualitative content of ideas and in particular overlap of content between different ideas. Potentially promising avenues for future research could for instance be to investigate what content or type of ideas are suggested most frequently by which organizational actors and whether such recurring ideas are suggested in light of legitimizing pre-existing policies or strategic objectives of the organization.

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