



# Opportunity Identification Competence

*Explaining individual and exploring team  
opportunity identification by employees*

Yvette Baggen



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Yvette Baggen

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A close-up, monochromatic photograph of a person's hands painting a flower. The person is using a fine brush to apply paint to the petals of a flower held in their left hand. The brush is dipped into a small, clear container of paint. The background is a soft-focus field of similar flowers.

**CHAPTER 1**

**General introduction**

**1**



## 1.1 Introduction

*“[A]n inquiry into entrepreneurial opportunity has the potential to unlock one of the greatest intellectual puzzles of our time, namely the creation of new value in society”*

*(Sarasvathy, Dew, Velamuri, & Venkataraman, 2010, p. 94).*

This dissertation reports on the meaning and role of opportunity identification (OI) for the employees of existing firms. OI is part of the initial stage of entrepreneurship, and refers to the generation and evaluation of business ideas that can be further explored and turned into potential opportunities. These opportunities are the starting point for realising all kinds of profitable business outcomes and changes, such as innovation, strategic renewal, and internal or external venturing (i.e., new value-creation). Here, the capability of employees to identify opportunities is elaborated upon from different points of view. This capability is referred to as opportunity identification competence (OIC).

This thesis begins with OIC: how it is embedded in theory, and the development and testing of a performance assessment to measure it. Next, antecedents are determined that foster OIC on the individual level. Finally, the cognitive frameworks of individuals and teams for identifying opportunities are investigated and compared. This first chapter contains the context, the main construct (i.e., OI), the problem statement, the research aim and questions, and the outline of the dissertation.

## 1.2 The context: LLLight'in'Europe

The research project presented here was part of the overarching, European-funded research project called “Lifelong Learning, Innovation, Growth & Human Capital Tracks in Europe” (LLLight'in'Europe). The European Union decided to start this research project because of the changing environment in which companies have to survive, characterised by technological change and national and global competition. For survival in such a turbulent environment employers rely heavily on their employees, who need lifelong learning capabilities to respond to the dynamics and complexity of everyday working life. Although investments in human capital are increasing, the question of how lifelong learning capabilities can be fostered remains unanswered. The aim of the LLLight'in'Europe research project was to investigate lifelong learning as a means to enhance employability and realise optimal productivity of the workforce (see [www.lllightineurope.com/home/general-information/](http://www.lllightineurope.com/home/general-information/)). In sum,

over 50 researchers from nine partners, including Wageningen University & Research, collaborated in the LLLight'in'Europe research project (for an overview of the partners, see [www.lllightineurope.com/partners/](http://www.lllightineurope.com/partners/)).

Most of the researchers involved focussed on the development and application of a new tool to assess a general and increasingly relevant human capital skill in the context of lifelong learning: complex problem solving (CPS). Mainly studied in the genre of cognitive literature, CPS refers to “an individual’s ability to solve complex and quickly changing problems” (see [www.lllightineurope.com/home/general-information/](http://www.lllightineurope.com/home/general-information/)). It is considered an important twenty-first century skill for creating a strong workforce, and it can foster lifelong learning capabilities (Autor, Levy, & Murnane, 2003). Research suggests that CPS predicts academic achievement, and relates to performance in educational contexts (Fischer, Greiff, & Funke, 2012; Wüstenberg, Greiff, & Funke, 2012), underlining the relevance of CPS as an important skill for professionals.

The research team from the Education and Competence Studies (ECS) group at Wageningen University & Research had a special position in the research project: *not* having its (main) focus on CPS. Within the LLLight'in'Europe research project, the ECS team was responsible for the question of how lifelong learning interacts with and promotes innovativeness on the enterprise level (see [www.lllightineurope.com/home/general-information/](http://www.lllightineurope.com/home/general-information/)), via employee-driven entrepreneurship. The decision to focus on employee-driven entrepreneurship was a logical one given the research scope of the ECS team on entrepreneurial competence. For instance, the team’s earlier research was directed towards investigating entrepreneurship competencies in entrepreneurship education and small businesses, and among independent entrepreneurs (Lans, Blok, & Gulikers, 2015; Lans, Hulsink, Baert, & Mulder, 2008; Lans, Verstegen, & Mulder, 2011; Mulder, Lans, Verstegen, Biemans, & Meijer, 2007). Accordingly, the aim of the ECS team was to investigate a lifelong learning capability that is more closely related to entrepreneurship. In keeping with this theme, the main construct of this thesis is *opportunity identification competence*: the ability of individuals to think of new ideas for products, processes, practices or services that can lead to new value-creation for the organisation (cf. Baggen et al., 2015).

The linkages between OIC and CPS skills in the context of entrepreneurship are explored in Chapter 2, as part of the LLLight'in'Europe research project. The main focus of this thesis, however, is opportunities and their identification. The following section includes further elaboration on OI.

### 1.3 Opportunity identification

Shane and Venkataraman (2000) stated in their influential article on entrepreneurship: “To have entrepreneurship, you must first have entrepreneurial opportunities” (p. 220). Opportunities are part of the defining, initial stage of the entrepreneurial process, as realising renewal and change always starts with the identification of a potential opportunity. Accordingly, studying the identification of opportunities has become a prominent topic in entrepreneurship literature (Shane & Venkataraman, 2000). The recently published special issue of the *Journal of Business Venturing* on the emergence of opportunities, edited by Suddaby, Bruton, and Si (2015), illustrates that the topic is still high on the agenda in entrepreneurship research.

OI is of interest not only to independent entrepreneurs, but also to employees as a way to respond to the ever-changing business environment they have to deal with (Corbett, Covin, O’Connor, & Tucci, 2013; Garrett & van Holland, 2015). As Corbett and colleagues (2013) argue, entrepreneurship in existing businesses is a key driver of competitive advantage. More specifically, opportunities and their identification are of significant importance for competitiveness in today’s complex and turbulent business environment because they serve as a key influencing factor for new value-creation (Davidsson, 2015). Accordingly, most of the empirical work described here was conducted in the context of existing firms. This is explained in the next section.

### 1.4 Opportunity identification by employees

As stated above, entrepreneurship is of interest not only to independent entrepreneurs, but also to existing organisations. Consequently, entrepreneurship scholars have investigated not only the new venture process, but also entrepreneurial processes within the context of existing companies (e.g., Bosma et al., 2013). In such research, entrepreneurship is often referred to as corporate entrepreneurship (Sharma & Chrisman, 2007) or intrapreneurship (Rigtering & Weitzel, 2013). As indicated by the title of this dissertation, this research is specifically aimed at exploring the ability of employees to identify opportunities. This is why, in the research described here, OI was investigated in the context of existing businesses<sup>1</sup>.

More specifically, most companies involved in the current research project were in the category of the small to medium-sized enterprise (SME). In Europe, 9 out of 10 enterprises is an SME. The European Commission (EC) has stated that SMEs are the “engine of the European economy” (EC, 2015, p. 3), playing a crucial role in stimulating

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<sup>1</sup> Although the terms company, business, firm, and organisation can, strictly speaking, have different meanings, these terms are used interchangeably in this dissertation.

competitiveness, economic growth and job creation, and creating entrepreneurial spirit. The context of SMEs is different from those of multinationals because SMEs generally do not have access to the same resources (Saru, 2007). Human resource (HR) practices in SMEs are often focussed on the short term and are less formal. Consequently, SMEs are considerably vulnerable in competitive contexts, which makes the need for entrepreneurship more urgent.

Moreover, as SMEs simply have limited human capital, their employees generally have more direct responsibility in contributing to the company's success. Additionally, employees that fulfil all kinds of jobs and roles play a crucial role in the entrepreneurial process, because many different categories of professionals are involved in entrepreneurship: not only research and development professionals, but also marketing, HR, financial, and management professionals and production workers (Desjardins, Lans, & Ederer, 2016; Toner, 2011). Taken together, in SMEs expectations are rather high for employees to contribute to OI. The companies that participated in the current research project have in common that they felt an urgent need for entrepreneurship as a driver of competitiveness, and all experienced the issues and challenges described in this section. The importance of OI is further described on the next page in the presentation of one of the participating companies, Schut Papier, as a case illustrative (1.1) of a company with entrepreneurship in its core business.

## 1.5 Problem statement

Although the importance of OI has been recognised from both theoretical and practical points of view, research on OI is still in an early stage (Suddaby et al., 2015; Vogel, 2016). Many empirical and conceptual studies lack a clear definition of opportunities (Davidsson, 2015; Vogel, 2016), and it is not always evident which part of the OI process is being investigated. As a result, it is complicated to compare studies, and theory on OI remains fragmented. There is still much to be learned about OI on a conceptual and empirical level, and about its meaning in the context of existing firms (Hornsby, Kuratko, Holt, & Wales, 2013; Ireland, Covin, & Kuratko, 2009). Below follows a short introduction to the literature on OI in three main areas: the OI process, defining OIC, and measuring OIC. This section is followed by a presentation of the current research aim and questions.

### Illustrative case 1.1 Schut Papier

An organisation recognising the importance of entrepreneurship is Schut Papier. This business, begun in 1618, is a rather small paper mill in the Netherlands. Schut Papier has a workforce of 40 employees, of which about 80% finished secondary education, and 20% completed higher education. The firm participated in the current research project and appeared to score high on entrepreneurship and innovation-related questions compared to the other SMEs. They appeared to be good at identifying opportunities and further developing them into profitable business outcomes.

As Schut Papier is such a small paper mill, it cannot compete with large manufacturers who produce large amounts of printing paper. Its management has to look for niches in which the firm can compete. Schut Papier is an example of an SME continuously involved in OI. At this company, “ideas to think about”, “ideas that need a decision”, and “developments in the present year” are stored systematically. A group of employees discusses the ideas; the ideas with potential are tested in the paper mill. Each week, five to 10 hours are scheduled for the performance of such tests in the factory.

This cycle of generating and evaluating potential ideas has resulted in several innovations. Concretely, Schut Papier has introduced five innovations in the period from 2012 to 2015 that were new for the market. For instance, Schut Papier is specialised in creating paper for artists; the firm can mark it with specific patterns or figures, and it must meet high quality standards. Furthermore, Schut Papier produces high-quality coloured paper that can maintain the same colour for more than six years. In addition, bio-based paper is being developed at Schut Papier, through experimentation with residual products from tomatoes and bell peppers.

### 1.5.1 The opportunity identification process

What opportunities are, and how they come into being, is a topic of lively discussion in the literature (e.g., Ardichvili, Cardozo, & Ray, 2003; DeTienne & Chandler, 2004; Renko, Shrader, & Simon, 2012). Some scholars argue that opportunities exist in the economic environment, waiting to be discovered (Companys & McMullen, 2007). Others argue that opportunities are subjective entities, socially constructed and created by individuals (Sarasvathy et al., 2010). The position scholars choose has an impact on how opportunities and the process underlying their identification are defined and investigated. Because using the term “opportunity” without defining it can be misleading (Davidsson, 2015), it is problematic that not all authors define OI (Vogel, 2016).

Despite these difficulties, several authors have described the OI process in helpful ways. Among these are Wood and McKinley (2010). Their model is helpful in understanding the OI process because they consider the roles of cognition, interaction and complexity in the “opportunity production process” (p. 68). These authors describe the OI process as starting when an individual has an imagined, rudimentary idea; in this very early stage, it is uncertain whether or not the idea could be a real opportunity (Wood & McKinley, 2010). In order to reduce uncertainty about the idea, the individual shares the idea with friends and family – with trusted others. Next, if the idea survives, the individual discusses it with significant stakeholders, such as potential investors and customers (Wood & McKinley, 2010). The interaction with trusted people and stakeholders results in a process in which the idea is further refined, improved, changed, acted upon, and sometimes abandoned.

In the Wood and McKinley (2010) model, the OI process is mainly explained from an individual point of view, by elaborating the process of sense-making and interaction with others. However, opportunities can be identified by teams as well as by individuals. The role of teams in entrepreneurship has mainly been investigated in research on independent entrepreneurship. For instance, successful and rapidly growing new ventures are often invented by teams (Foo, Sin, & Yiong, 2006). Similarly, in organisations, inventing and developing innovations is often a team effort (Anderson & West, 1998). In existing firms, individuals have access to all kinds of resources, and teams are easily accessible for the sharing of ideas (Corbett & Hmieleski, 2007). Taken together, investigating the role of both individuals and teams in the OI process is considered crucial in understanding entrepreneurship in businesses. However, although the literature offers some insight into OI in existing firms at the



individual level, only few researchers have investigated OI at the team level (Shepherd & Krueger, 2002).

The cognitive perspective (Corbett & Hmieleski, 2007) is helpful for improving our understanding of team OI. Cognitions in entrepreneurship have been studied in different contexts and at the individual and team levels (e.g., Baron & Ensley, 2006; de Mol, Khapova, & Elfring, 2015; Krueger, 2000). In the genre of cognitive literature, especially studies comparing expert and novice entrepreneurs provided insight into how entrepreneurs develop cognitive frameworks or scripts that enable them to become entrepreneurial experts (Dew, Read, Sarasvathy, & Wiltbank, 2009). Cognitive frameworks function as a template, and can help to recognise meaningful patterns and links between apparently independent events and information (Baron & Ensley, 2006). Baron and Ensley (2006) developed cognitive OI frameworks for experienced and novice independent entrepreneurs. The results of their empirical study showed that the cognitive OI frameworks of experienced, independent entrepreneurs are directed towards identifying opportunities that solve customer problems, that have manageable risks, and that fulfil other criteria directly relevant for starting a business. Novice entrepreneurs, on the other hand, tend to focus more on the uniqueness or newness of ideas (Baron & Ensley, 2006).

However, although the literature reflects significant efforts analysing cognitive frameworks for independent entrepreneurship, empirical research on cognitive frameworks for OI in existing businesses is rather complex, and still limited (Hornsby et al., 2013; Ireland et al., 2009), especially when differentiated by individual and team levels (Grégoire, Corbett, & McMullen, 2011; Shepherd & Krueger, 2002). As a consequence, it remains unclear how the cognitive frameworks differ for OI by individuals and teams.

### **1.5.2 Defining opportunity identification competence**

As stated above, organisations rely heavily on their employees for identifying opportunities (Corbett et al., 2013). The capability of employees to identify opportunities is therefore considered an important and highly relevant part of organisations' human capital. This thesis focuses on this capability, referred to as opportunity identification competence (OIC). There has been an intensive debate about the terms competence and capability, and the tentative conclusion of that debate is that these terms can be used interchangeably (Mulder, 2017). Mulder (2014) defined professional competence as "the generic, integrated and internalized capability to deliver sustainable effective (worthy) performance (including problem solving,

realizing innovation, and creating transformation) in a certain professional domain, job, role, organizational context, and task situation” (p. 111). Here, the definition of Mulder (2014) is adopted, and OIC is conceived of as an integrated set of knowledge, skills, and attitudes, which individuals need in order to identify opportunities. OIC constitutes the capability of people to identify opportunities, while OI itself is the process underlying, and activities involved in, identifying opportunities.

According to Kyndt and Baert (2015), the role of individuals in entrepreneurship has been explored using both personality and competence approaches. The personality approach focuses on fixed traits of the individual. The competence approach, which is applied in the present thesis, is directed towards aspects that can be developed (Kyndt & Baert, 2015). Biemans and colleagues (2009) also argue that competencies can be developed or learned. Accordingly, OIC is considered a capability that employees can develop. Moreover, competencies and their context are always connected: without a context, competencies have little meaning (Biemans et al., 2009; Mulder, 2014). Consequently, insight into the role of the context in OIC is needed to understand how the context effects the development of individual OIC. In other words, investigating the role of context factors, referred to as antecedents, can help to get a better grasp on *explaining* individuals' OIC.

In addressing the question of which antecedents influence OIC in existing businesses, a helpful angle is to look at the learning aspect in entrepreneurship. More specifically, Minniti and Bygrave (2001) argue that “entrepreneurship is a process of learning, and a theory of entrepreneurship requires a theory of learning” (p. 7). Correspondingly, it is considered important to grasp *what* and *how* entrepreneurs learn (Wang & Chugh, 2014). According to Politis (2005), authors particularly refer to OIC as an important outcome of entrepreneurial learning. The literature on independent entrepreneurship and organisational learning is helpful in understanding how entrepreneurs learn. Scholars investigated the role of a range of possible antecedents in OIC, such as social and work environment characteristics, and job characteristics (e.g., Bosma et al., 2013; DeTienne & Chandler, 2004; Gielnik, Frese, Graf, & Kampschulte, 2012; Wang, Ellinger, & Wu, 2013). For instance, Wang and colleagues (2013) found that social networks, self-efficacy, prior knowledge, and the self-perceived industrial environment all significantly and positively influenced individual OIC. Bosma and colleagues (2013) found that actual involvement in entrepreneurial activities positively affects OIC, which is in line with earlier research showing that entrepreneurs learn mainly by doing (Cope, 2005). However, although significant steps have been taken in investigating the role of antecedents in OIC, empirical work on how entrepreneurial

learning (and, analogously, OIC) can be fostered in the context of existing businesses is still scarce (de Jong, 2013). It remains unclear which antecedents play a significant role in OIC in the specific context of existing businesses.

### 1.5.3 Measuring opportunity identification competence

Beyond understanding the OI process and the role and meaning of OIC in that process, it is important to examine how OIC can be measured. In several studies, OIC was measured in various samples using different instruments, such as self-assessments and interviews in which participants had to think back and list previously observed opportunities (e.g., DeTienne & Chandler 2004; Ozgen & Baron, 2007; Ucbasaran, Westhead, & Wright, 2009; Wang et al., 2013). For instance, the self-assessment applied by Ozgen and Baron, and by Wang and colleagues, included the question, "To what extent do I have a special 'alertness' or sensitivity toward new venture opportunities?" DeTienne and Chandler (2004) asked participants to think back to the last 24 hours and to list all business opportunities they had observed. Although these and other studies contributed significantly to understanding OIC, several authors emphasised the limitations of these methods, arguing that these might not fully capture OIC because interviews and self-assessments measure perceptions, feelings, and impressions instead of actual behaviour (Corbett, 2007; Shepherd & DeTienne, 2005). Consequently, several authors (e.g., Gaglio & Katz, 2001; Shepherd & DeTienne, 2005) suggest measuring the actual thinking or behaviour of employees, and they call for the development of performance tests to assess OIC.

### 1.6 Research aim and questions

The importance of OI by employees is widely recognised, and scholars have contributed significantly to understanding what opportunities are, how opportunities come into being, what antecedents influence OIC, and how OIC can be measured. Nevertheless, as described in the previous section, substantial research challenges still need to be addressed. More specifically, based on the above-mentioned literature, three overarching research issues have been identified:

1. The OI process has not been fully mapped out, including the role of individuals and teams.
2. Defining and explaining OIC is problematic.
3. Existing measurements of OIC have been criticised.

The main goal of this thesis is to contribute to the literature by addressing these three overarching research issues. Accordingly, the central research question is: *What characterises opportunity identification by employees on the individual and team level?*

In order to answer this central research question and to address the three overarching research issues, five research sub-questions were formulated, and these are discussed in the next chapters.

The first research sub-question is, *“What is OIC?”* First of all, OIC is brought to light and defined through literature study, yielding a common definition of OIC for this thesis.

Secondly, in order to fully capture OIC, insights are needed into how it can be operationalised and assessed. Next, therefore, follows elaboration on the research sub-question, *“What is a suitable instrument for assessing OIC?”* In response to this research sub-question, OIC is operationalised and a performance assessment to measure OIC is developed and tested.

Then, after OIC has been defined and operationalised, it is investigated in the context of existing businesses on the individual level. This leads to the third research sub-question: *“What are antecedents of individual OIC (as an outcome of entrepreneurial learning) in a small and medium-sized business context?”* Individual OIC is investigated from an entrepreneurial learning perspective to gain insights into the antecedents of OIC, and thus in how the SME context affects OIC.

After *explaining* individual OIC, the fourth and fifth research sub-questions are aimed at *exploring* OI on the team level. Research sub-question number four is, *“To what degree do individual employees and teams have different cognitive OI frameworks for identifying business opportunities?”* And research sub-question five is, *“To what extent do the cognitive OI frameworks of individual employees and teams correspond with the cognitive OI framework of an experienced, independent entrepreneur?”* Whereas the learning and competence perspective provides insight into the capabilities that people need in order to identify opportunities, the cognitive perspective provides insight into the behavioural patterns that can be recognised in how individuals and teams identify opportunities, by mapping and comparing their cognitive OI frameworks.

Each research sub-question relates to one or more of the three overarching research issues. How the research sub-questions, research issues and chapters relate to one another is explained in the next section.

## 1.7 Outline of this dissertation

Following this introductory material in Chapter 1 is Chapter 2, which is related to research sub-question number one. OIC and CPS skills are explained and compared, to yield insight into their roles in entrepreneurship. This chapter begins with elaboration on the research roots, process models and measurements of CPS and OI. Next, CPS skills and OIC are compared, in the context of entrepreneurship. The discussion of OIC and CPS skills provides helpful insight into the conceptual boundaries of the two constructs, and how they relate to entrepreneurship. Consequently, the discussion in this chapter provides insight into what is already known from the literature in relation to the three research issues. As stated above, CPS was the central concept of the LLLight'in'Europe research project, and OI is the central concept of this thesis. Accordingly, in the following chapters, only OI is further elaborated.

Chapter 3 relates to research sub-question two. The development and application of a performance assessment to measure OIC is presented. The performance assessment, referred to as the opportunity identification competence assessment test (OICAT), is developed in response to the need for instruments that measure more closely actual thinking or behaviour (e.g., Gaglio & Katz, 2001; Shepherd & DeTienne, 2005). The OICAT was developed and tested in higher education, as a solid and suitable setting for examining the use and quality of the assessment, before applying it among employees. The assessment is developed in such a way that it is applicable to a wide variety of respondents and can be used to investigate and compare the OIC of different groups of participants (e.g., students, independent entrepreneurs, and employees). The results of this chapter contribute to understanding how OIC can be measured (i.e., the third research issue). The results also help to define OIC and to elaborate the OI process, by providing insight into the specific tasks and competencies involved in OI.

The studies presented in Chapters 4 and 5 were conducted in businesses (i.e., mainly in SMEs). Chapter 4 relates to research sub-question three. Here the aim was to *explain* the OIC of individual employees by investigating what antecedents (i.e., context factors) influence their OIC. Because of interest in the OIC of employees working for existing firms, a context-specific measurement for OIC was applied that is different from the measurement developed in Chapter 3. More importantly, in Chapter 4 OIC was the outcome variable in the statistical model. Therefore, a measurement of OIC was used that includes an indication of an individual's performance in identifying opportunities. Based on literature on independent entrepreneurship and organisational learning, antecedents of individual OIC were selected and tested for their influence on

OIC. The results mainly relate to the second research issue, as investigating the role of the existing firm context on OIC deepens the understanding of the competence domain. Additionally, because a different measurement was used here (from the OICAT as presented in Chapter 3), the results also contribute to understanding how OIC can be measured.

Chapter 5 relates to research sub-questions four and five. Here, the team level was included alongside the individual level. The cognitive OI frameworks of individual employees and teams were compared to one another as well as to the cognitive OI framework of experienced, independent entrepreneurs. In this study, the aim was to *explore* OI on the team level. The results contribute to understanding the process underlying OI (i.e., the first research issue), as they provide insight into the role of individual employees and teams in the OI process.

In Chapter 6, the final chapter, the main research findings are first briefly summarised and the research sub-questions answered. Next, main conclusions are presented and the results of the different studies are integrated and jointly discussed in relation to the three overarching research issues presented above. Furthermore, the limitations and the implications of the results for theory and practice are discussed on the SME, higher education, and policy level.

Figure 1.1 presents an overview of the six chapters. As shown in the figure, Chapters 1, 2 and 6 are overarching chapters containing discussions of theory. In Chapters 3, 4 and 5, empirical studies are presented.

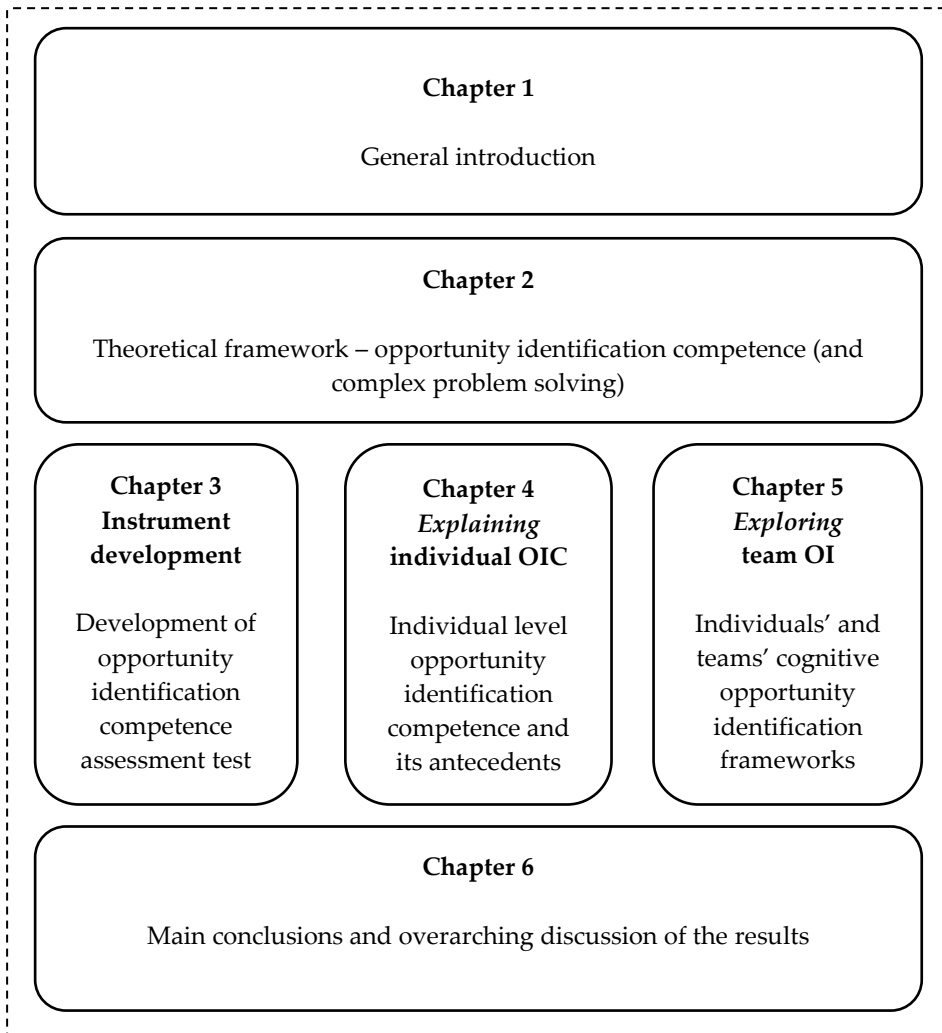


Figure 1.1. Representation of the chapters of this dissertation.







## CHAPTER 2

# Linking complex problem solving to opportunity identification competence within the context of entrepreneurship<sup>2</sup>

2

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<sup>2</sup> This chapter is based on:

Baggen, Y., Mainert, J., Lans, T., Biemans, H.J.A., Greiff, S., & Mulder, M. (2015). Linking complex problem solving to opportunity identification competence within the context of entrepreneurship. *International Journal of Lifelong Education*, 34, 412-429. doi:10.1080/02601370.2015.1060029

**Abstract**

2

Today's working life is increasingly characterised by entrepreneurial challenges. Entrepreneurial challenges start at an individual level with the identification of opportunities, which is acknowledged as one of the key competencies for lifelong learning. Since the identification of opportunities relies heavily on the opportunity identification competence (OIC) of individuals, understanding the meaning of OIC is relevant. Research shows that individuals have different capabilities for identifying opportunities. However, scholars until now have not fully explained these differences in OIC. According to several authors, the research on complex problem solving (CPS) in the cognitive research field might contribute to understanding OIC. In this paper, we review the link between OIC and CPS by comparing the cognitive and entrepreneurship research fields. We argue that those who excel in identifying opportunities share core characteristics with high-level complex problem solvers. We propose to conduct empirical research in the future to investigate the relation between OIC and CPS within a work context, in order to gain more insight into OIC. We believe that the cognitive research field contributes to the entrepreneurship research field and provides a deeper understanding of the initial steps of the entrepreneurial process.

## 2.1 Introduction

In today's society, facing entrepreneurial challenges has become part of everyday's working life. From 2000 until 2011, the number of independent professionals in Europe has increased with almost 100% (Rapelli, 2012). According to the Global Entrepreneurship Monitor (GEM) almost one out of ten adults (18-64 years old) in Europe was in 2013 involved in the process of starting or already running a new businesses (Amorós & Bosma, 2014). Also daily work at more mature organisations is increasingly spiced with entrepreneurial challenges: a trend is discernible towards 21<sup>st</sup> century tasks that require innovation, more autonomy, and a decrease of routines (Autor, Levy, & Murnane, 2003; Hornsby, Kuratko, Shepherd, & Bott, 2009). In addition, the European Union has set out sense of initiative and entrepreneurship as one of the key competencies necessary for lifelong learning (European Parliament and the Council of the European Union, 2006). In order to start-up new ventures, innovate within existing companies or to adapt flexibly as worker to a rapidly changing world, individuals need to be able to identify high potential opportunities, which is a topic in the conceptual heart of the scientific field of entrepreneurship (Shane & Venkataraman, 2000).

It is assumed that those who are able to identify opportunities can contribute significantly to personal, professional, and/or business development (European Parliament and the Council of the European Union, 2006; Ireland, Hitt, Camp, & Sexton, 2001). Pursuing opportunities may lead to different activities and outcomes such as independent entrepreneurship (e.g., start-ups, social enterprises), innovation, strategic renewal, internal or external venturing, and so on (see for a classification of entrepreneurship, intrapreneurship, and innovation, Sharma & Chrisman, 2007). Nonetheless, the road from initial idea to realisation is far from straightforward. For instance, figures from the Netherlands show that about 2.5% of all Dutch horticulture companies introduce innovations truly new for the country (Pannekoek, van Kooten, Kemp, & Omta, 2005), and for those who start many do not even become real business owners (i.e., they drop out before they have been in business for three and a half years; Amorós & Bosma, 2014). Similarly, from a large company perspective, Stevens and Burley (2003) estimated that out of 3000 raw ideas only one will eventually become a commercial success. Thus, getting more insight into the initial steps in this process and necessary competence, referred to here as opportunity identification competence (OIC), seems to be necessary from a practical point of view.

From a theoretical point of view, studying entrepreneurial behaviour - and more specifically its defining initial stage, the identification of opportunities - has become

prominent in entrepreneurship literature, and has opened up the door for examining entrepreneurship in different contexts (e.g., new ventures and existing organisations) as well as among different target groups (e.g., intrapreneurs, small business owners, employees, nascent entrepreneurs, ordinary people), and relating it to learning and development issues (Dimov, 2007b; Dutta & Crossan, 2005). In short, opportunities come into being when ideas and beliefs about the experiential world come together and the resulting actions enable the creation of a future good or service (Wood & McKinley, 2010). The identification of opportunities starts at the individual level, and therefore relies heavily on individual capabilities (du Chatenier, Verstegen, Biemans, Mulder, & Omta, 2010; Reid & De Brentani, 2004).

Research on opportunity identification (OI) shows that individuals have different capabilities in identifying opportunities. To explain those differences, some authors refer to differences in divergent thinking skills (i.e., generation of multiple, novel, and original ideas; Ward, 2004). Also personal characteristics, such as self-efficacy, are mentioned as factors that explain variance of OI (Rauch & Frese, 2007b). As an attempt to gain more systematic insight into OI and its underlying process, it is suggested in entrepreneurship literature that differences in OI are the result of a complex interplay between cognitive and other psychological processes that individuals employ in their entrepreneurial endeavours (Hsieh, Nickerson, & Zenger, 2007). Along these lines of inquiry are those who suggest that OI needs key efforts, which are comparable to complex problem solving (CPS; Nickerson & Zenger, 2004). To start, Hsieh and colleagues (2007) argue that the initial steps of entrepreneurship are influenced by cognitive search for strategies to solve a complex problem. Stevenson and Jarillo (1990) argue that individuals need to accumulate knowledge that “assists in problem solving” (p. 23) to deal with entrepreneurial challenges. Besides, having to establish a new means-end relationship, individuals have to identify, define, and structure novel solutions to open-ended problems (Shane, 2000). However, the role of CPS in OI is not elaborated upon thoroughly yet.

To summarise, individual OI is assumed to play a key role in dealing with entrepreneurial challenges which have become prominent in our daily working lives. Although attempts have been made to explain differences in OI among individuals, more systematic, integrative studies are called for (e.g., Hsieh et al., 2007). Since the literature indicates linkages between OI and CPS skills, we aim to integrate the entrepreneurship and cognitive research fields in this conceptual paper to gain deeper insight specifically into the relation between OI and CPS skills. The main question is as follows: *to what extent is OI related to CPS skills on a conceptual level?* We aspire to

elaborate from a theoretical point of view on the exact role CPS plays in entrepreneurial tasks, in particular OI. Research on CPS can contribute to the understanding of OI, as psychological research has already proven that CPS is a relevant, reliable, and valid predictor of academic achievement, and results of several studies provide support for an understanding of CPS as a transversal skill that yields substantial relations to performance in educational contexts (Fischer, Greiff, & Funke, 2012; Wüstenberg, Greiff, & Funke, 2012). Moreover, CPS is considered to be a 21<sup>st</sup> century skill and efforts targeting 21<sup>st</sup> skills from a lifelong learning perspective have been gaining increased attention (Autor et al., 2003; the Organisation for Economic Co-operation and Development (OECD), 2010). Requiring more insight into OI, representing the initial steps of entrepreneurship, is needed since it has repeatedly been claimed that sense of entrepreneurship is a key competence in the context of lifelong learning (European Parliament and the Council of the European Union, 2006).

In this conceptual paper, the research roots, process models and assessments of OI (i.e., *what is OIC*) and CPS will first be discussed separately. Thereafter, we explore the ties and distinctions between OIC and CPS skills, and elaborate how the cognitive research field could contribute to the entrepreneurial research field. To conclude, we put forward a future research agenda.

## 2.2 Opportunity identification

Within the entrepreneurship research field, the research roots of opportunities and the process leading towards identification and exploitation are approached as either objective or subjective (Renko, Shrader, & Simon, 2012). The position one chooses distinctly defines the competence domain necessary for this process. Accordingly, we next present an elaboration of the objective and subjective approach. In addition we argue our position within this debate.

Followers of the objective approach argue that opportunities exist out there, meaning that opportunities exist in the economic environment as objective entities (Companys & McMullen, 2007; Renko et al., 2012). Disequilibrium on the labour market and competition are sources for opportunities, as they emerge from inefficiencies in complex webs of markets, networks, and technologies (Kirzner, 1997). Several characteristics of an individual influence OI and exploitation, including social networks, personality traits, and prior knowledge (Kirzner, 1997; Wang, Ellinger, & Wu, 2013). Moreover, every individual is driven by a certain degree of entrepreneurial alertness. Alert individuals are motivated and able to perceive the market correctly, to recognise the driving forces and crucial factors that influence the market, and hereby to

recognise opportunities as they emerge when the existing goods and services are no longer sufficient.

Adherents of the subjective view argue that opportunities are subjective constructs, which cannot be discovered as assumed in the objective definition. Instead, according to this view opportunities are created by individuals (Sarasvathy, Dew, Velamuri, & Venkataraman, 2010; Wood & McKinley, 2010). Social cultural practises and social situatedness enable the identification of opportunities (Fletcher, 2006; Wood & McKinley, 2010).

Opportunities can thus be objective or subjective by definition, depending on the underlying view: an opportunity can either be discovered in the economic environment or created by an individual in interaction with his or her social environment. Fletcher (2006) states that models based on the objective view help us to identify factors that characterise the identification and exploitation of opportunities, such as the influence of prior knowledge and entrepreneurial alertness. However, these models do not provide much guidance in explaining *how* people enact opportunities in a certain manner and time in relation to their context. Adherents of the subjective view do provide a thorough understanding of the complexity and the social nature of opportunities (Fletcher, 2006). They stress that it is the entrepreneur or intrapreneur who constructs opportunities in interaction with his or her environment.

As Dutta and Crossan (2005) argue, we agree that one “needs to be able to reconcile or even to synthesize the apparently conflicting positions of the two ontological approaches” (p. 433). The objective and subjective view both seem to elaborate on different elements of the OI process. The objective view elaborates more on the cognitive side of the identification and exploitation of opportunities, by focussing on valuable characteristics of the opportunity process, such as entrepreneurial alertness. The subjective view accounts for the situatedness and social complexity of opportunities, and hereby provides a deeper understanding of how opportunities come into being and develop over time. Therefore, elements of both views are used as inputs for this dissertation (Dutta & Crossan, 2005).

### 2.2.1 Elaborating the OI process

According to Wood and McKinley (2010), who espouse the subjective view in their article, the OI process, to which they refer to as the opportunity production process, consists of two stages: opportunity objectification and enactment of the opportunity.

The first stage concerns *opportunity objectification*. This stage encompasses a set of initial ideas in the mind of an individual, and the objectification of ideas into an

opportunity. To come up with ideas, an individual continuously reflects upon the social world he or she lives in. As mentioned in the introduction of this chapter, also factors such as prior knowledge or the creativity of an individual influence individuals' ability to come up with ideas (DeTienne & Chandler, 2004; Guilford, 1981). Divergent thinking capabilities, for instance, explain 7% of the variance in the number of generated business ideas and 16% of the originality of those ideas (Gielnik, Frese, Graf, & Kampschulte, 2011). To discover how good an idea is, an individual starts a process of sense-making: the individual shares the idea with peers such as friends, family, and other people the individual trusts. As a result, abandonment or the objectification of an idea takes place (Dimov, 2007a; Wood & McKinley, 2010). Whether an idea gets abandoned or objectified depends on the trust the individual has in his or her peers and the agreement among peers about the potential of the idea. Once an idea is objectified, it no longer exists solely in the mind of the individual: an opportunity has gained external status.

The second stage concerns the *enactment of the opportunity*. This stage includes the further development of an opportunity, based on the acquisition of support amongst relevant stakeholders (Wood & McKinley, 2010). Relevant stakeholders are, for instance, investors or potential customers. In a process of intense dynamic interaction and negotiation with the stakeholders, the individual strives for a shared understanding of the opportunity. This might result in the objectification of the opportunity for the stakeholders and the further development of the idea into a new product, process, service, or practise (Sarasvathy et al., 2010).

Based on the subjective process model, OI seems to be an important part of the opportunity objectification process. Opportunity enactments seems to go one step further when the opportunity is developed into concrete prototypes, plans, formats, and so on. Based on the above discussed theories, we define OIC as follows: *The ability of individuals to identify ideas for new products, processes, practices or services in response to a particular pain, problem or new market need*. The process of identifying opportunities may eventually lead to the creation of new value, such as new products, processes, services, or practises.

### 2.2.2 Assessment of OIC

The first commonly used method to measure OIC is self-assessment (Chandler & Jansen, 1992). Although self-assessments are commonly used to explore OIC, the reliability and validity of self-assessments are doubtful: what people say they do might be different from their actual behaviour (Corbett, 2007; Wang et al., 2013). A more

direct, alternative method to measure OIC is the investigation of the number and quality of ideas generated by individuals. For instance, DeTienne and Chandler (2004) asked participants to list the business opportunities they had observed during the last 24 hours. However, the recall of opportunities identified in the past might be influenced by biases of recall and retrospection (Corbett, 2007). For this reason, Corbett (2007) asked respondents to sum up as many ideas as possible for a standardized problem case. The method of Corbett (2007) shares characteristics with a commonly used test of divergent thinking. In one of those tests, participants are asked to generate as many possible uses for, for instance, a brick and a newspaper, that are different from the standard use (Guilford, 1981). Hence, the supporting role of creativity in the identification of opportunities is visible in these assessment methods.

### 2.3 Complex problem solving

The research roots leading to CPS are diverse. Therefore, in this section, we clarify its origins in science, definition, CPS assessments, and involved cognitive processes.

Just like domain-specific approaches to CPS, our current research approach to CPS is founded in the European line of research (e.g., Dörner, 1986; Funke, 2001). We focus on domain-general and context-neutral aspects of problem solving as part of so-called transversal skills. CPS can be assessed in interactive, computer-based tests with individuals (e.g., Wüstenberg et al., 2012). This focus on CPS is in line with a more general and less domain-bound understanding of CPS for being able to adapt and innovate in response to new demands and changing circumstances (Binkley et al., 2012). CPS can thereby be considered an integral component of what Binkley and colleagues (2012) classified as 21<sup>st</sup> century skills.

#### 2.3.1 Research roots of CPS leading to a process model of CPS

Coming from the realm of cognitive science, CPS has its roots primarily in the research domains of human problem solving, decision-making, and intelligence. These research domains help to grasp CPS and open gateways for the detection of linkages between CPS and OI. *How* people process *what* information, make decisions, and cognitively operate are the focus of this section.

Originally, Dörner (1976) describes problems as barriers between the given situation and the intended goal state. The barriers are due to a lack of knowledge about the functioning of a system. This lack of knowledge can either be deficient strategies of solutions or an ill- defined goal state (Dörner, 1976; Funke, 2003). For example, technical engineers in renewable energies are nowadays in demand every time an



organisation faces the encounter of complex and multidisciplinary issues in a rapidly developing field. More specifically, strategies of environment protection go hand in hand with the continuous development of new technology and its processing. A lack of knowledge about the functioning of only one component can be considered a barrier that makes ecological strategies deficient.

With regard to solving problems, Newell and Simon's (1972) theory of human problem solving is the most general conception and can be applied on problems of real-world complexity. According to these authors the main components of problem solving are a *problem space* or internal representation of a solver, who does not immediately know what series of actions to perform, and the solver's search for a strategy to tackle the problem (i.e., overcome the barriers). In complex environments such as the initial steps of entrepreneurship, where the distribution of information is not perfect across people (Kirzner, 1997), only those entrepreneurs who *do* possess relevant information within their problem space eventually know, what series of actions to perform to tackle problems around a future product. For example, advances in innovative technologies, such as fuel-efficient hybrid vehicles, enable the producer to release the product earlier on the market than competitors who lack relevant knowledge. In the last decade, this was seen in the sector of hybrid automobiles, which has long been dominated by only one brand that employed research and development teams of individuals with superior internal representations about how to overcome barriers of technological shortcomings of previous hybrid prototypes.

Once the problem solver has chosen a strategy to select relevant information, this strategy can alter the initial problem space by uncovering new possible solutions and pathways of getting there or, on the downside, create unexpected (sub-) problems. The latter case means the initial expectations about the problem structure are incorrect or incomplete (Dörner, 1989), and the interaction with the problem during the acquisition of knowledge discloses errors in the problem space (Funke, 2001).

The moments when the problem representation itself is challenged are called *corrective moments*. These corrective moments might portray roots for entrepreneurship. The Theory of Representational Change (Ohlsson, 1992) labels the trigger event of the corrective moments in the problem space impasse. It is a state in which the current internal problem representation is not sufficiently equipped with operators and information to solve the problem. An impasse provokes a change of the representation through an intensified search for information, a relaxation of constraints; in other words, removing restrictions and applying thinking outside the box, or a reinterpretation of the internal representation. *How* strategies are chosen and applied to

*what* selection of information with regard to the limitations of human cognitive capacities, is the topic of the next section.

The goal of each step during the process of solving a problem involves a decision for or against an action and its alternatives (Dörner, 1986). A variety of possible actions might occur at a later stage of the problem space, when strategies have been chosen and applied on a relevant selection of available information. At this point, the challenge lies more in configuring a parsimonious internal representation, which is considered a prerequisite for efficient decision-making (Klauer, 1993). For the creation of a parsimonious representation, constant changes to the selection of a vast amount of accessible information, relevant and irrelevant, have to be made. Only then the decision for an action in complex scenarios can be placed on solid ground.

Complex scenarios share features that distinguish them from problems in general as defined by Funke (2003). These features are the complexity of the structure, the dynamics of the system, the interconnections of the variables, the ambiguity of how to approach the task, and the intransparency of the situation (Fischer et al., 2012).

At the stage of a parsimonious representation of a complex problem, the gateway to genuinely new and innovative solutions is wide open but at the same time regulated by the limits set to human cognitive resources (Gigerenzer & Brighton, 2009). When the problem solver resumes the exploration and acquires even more knowledge, a tension between the collection of information and need for its reduction is likely to occur. The problem solver is in constant need of maintaining a parsimonious internal representation within the restrictions of his or her cognitive capacity. Distinguishing between goal-directed and irrelevant information is key to an efficiently composed problem space.

Newell and Simon (1972) suggest to reduce complexity through an abstraction of the problem space and its later detailed re-translation in the situation at hand. This strategy illustrates how information is processed after only relevant information was selected for efficient problem solving.

### **2.3.2 Definition of CPS**

Based on the previous section, we can say that complex problem situations are characterized by a combination of novelty, dynamics, intransparency, and the need to engage in self-initiated learning behaviour (Warr & Bunce, 1995). Buchner (in Frensch & Funke, 1995) gives this definition of CPS processes in the realm of cognitive science:

The successful interaction with task environments that are dynamic (i.e., change as a function of user's intervention and/or as a function of time) and in which some, if not all, of the environment's regularities can only be revealed by successful exploration and integration of the information gained in that process. (Frensch & Funke, 1995, p. 14)

As a consequence, the relevant information needs to be actively generated in CPS tasks in order to successfully control a dynamic, previously unknown system. Building on Buchner (in Frensch & Funke, 1995), Greiff, Holt, and Funke (2013) describe the individual skill set required to solve a problem:

Finding out how the system under question works (i.e., exploration: finding a strategy to build up knowledge; i.e., a representation) and trying to move toward a given goal (i.e., control: applying the acquired knowledge to reach a certain goal; i.e., to solve the problem). (Greiff et al., 2013, p. 77)

It follows that the two main processes are knowledge acquisition leading to a representation of the problem space (e.g., Klahr & Dunbar, 1988) and knowledge application, which, if appropriate, provides a solution of the problem (e.g., Novick & Bassok, 2005).

### 2.3.3 The process of CPS

Portraying CPS as (a) knowledge acquisition and (b) knowledge application (Leutner, Wirth, Klieme, & Funke, 2005) contributes to an understanding of CPS as a process (Fischer et al., 2012). This process usually starts in (a) knowledge acquisition with (1) *information generation* in an intransparent situation with the most ecologically rational strategy at hand, continues with (2) *information reduction* in order to keep a set of relevant information, leading to an (3) actionable *internal representation*, which allows (b) knowledge application through (4) *decision-making* on the basis of an abstraction in the problem space, and (5) an *evaluation* of the solution amongst many alternatives and against the backdrop of interfering and/or ill-defined goals (Fischer et al., 2012).

### 2.3.4 Assessment of CPS

The empirical realisation of the process of CPS can be handled with the help of computer-based microworlds. The scenarios allow for the simulation of complex problems (e.g., Greiff, Wüstenberg, & Funke, 2012) and have been constantly refined in

the last decades. The most recent scenarios are based on multiple complex systems (Greiff et al., 2013). The multiple complex systems framework consists of an entire battery of relatively short CPS tasks with varying difficulties and semantics. MicroFIN is a representative for multiple complex systems (see Figure 2.1 and Greiff et al., 2012). The following results were, without exception, assessed with the multiple complex systems approach.



Figure 2.1. Screenshot of the MicroFIN item 'Planomat'. Problem solvers have to balance the interests of various stakeholders in a city by way of alterations of the urban landscape. Along the bottom and the right side: the keys for altering the location of the interest groups. In principle, two stakeholders change places when triggered. On the right side: a city mall and a factory. On the left side: a family home and a playground. Between these stakeholders, smileys indicate the atmosphere. The problem solver has to improve the atmosphere by finding an optimal set-up.

The computer-based microworlds as exemplified in Figure 2.1 allow for detailed task analyses (e.g., the detection of an assumed 2-step-process of knowledge acquisition and knowledge application by analysing the pattern of interaction with the task).

## 2.4 Conceptual ties and distinctions

The elaboration on OI and CPS puts several points of comparison forward. In order to disentangle the ties and distinctions between OI and CPS on a conceptual level, these points of comparison will be discussed in separate sections. We will increasingly discuss on a more detailed level the ties and distinctions between OI and CPS in the context of entrepreneurship: the common ground of problems and opportunities; goals of OI and CPS; ties and distinctions between competence domain and skills; prerequisites of OIC; and process models of OI and CPS. To conclude, we will discuss to what degree the two different fields of research can contribute to one another.

### 2.4.1 What is the common ground between problems and opportunities?

In colloquial contexts, problems have a negative connotation. However, in the context of entrepreneurship a problem is defined as a challenge. According to Mayer (2003), a problem occurs whenever a goal state needs to be achieved. A problem can start at any given state, and there is no routine strategy of solution available. Recall that *complex* problems are characterised by a complex structure, dynamics of the system, interconnection of variables, ambiguity of how to approach a task, and intransparency of a situation (Fischer et al., 2012). Especially when it comes to *complex* problem solving, the barriers to reach an intended goal state are hard to overcome. Despite the complexity, entrepreneurs feel challenged by such situations and do not necessarily experience them as problems.

In summary, based on the definition of complex problems in light of the entrepreneurship research field, complex problems consist of a given situation, and a goal state with barriers in between. We argue that opportunities emerge at the moment that an individual identifies a complex problem situation as being an entrepreneurial challenge, and comes up with a solution to fill the gap between the given, complex situation and the desired goal state.

### 2.4.2 Comparison of the outcomes of the OI and problem solving processes

As mentioned before, OI starts when individuals come up with business ideas (Wood & McKinley, 2010). Some ideas objectify, after a process of evaluation, into an opportunity. Enactment of the opportunity might lead to new value-creation: the successful exploitation of ideas into new products, processes, practises, or services (Shane & Venkatamaran, 2000).

Problem solving in general is directed towards making decisions and solving problems within the limits of cognitive capacities (Gigerenzer & Brighton, 2009).

Referring to Dunbar (1998), we can say that problem solving is about the successful search of a strategy to make something work or control a system in an efficient way.

Although the OI and CPS models aspire somewhat different outcomes, they do share core principles. Sarasvathy and colleagues (2010) notice that “we could model an entrepreneurial opportunity as a function, or a process or a set of decisions” (p. 79). Here the overarching opportunity process shares the core principle of the problem solving process, as a set of decisions is necessary to accomplish the desired outcomes of both processes.

### 2.4.3 CPS is a skill, OI a competence domain

Throughout this paper, CPS is defined as a skill and OI as a competence domain. The relation between a skill and a competence domain will be discussed in this section.

An individual is competent when he or she acts responsibly and effectively based on given standards of performance. Although the concept remains subject of debate, recent notions of competencies define these as integrated clusters of knowledge, skills, and attitudes, functioning within a specific position and context (Mulder, 2014). Translated to OIC, individuals need prior knowledge to identify an opportunity (Shane, 2000). For instance, a builder is less prone to identify an opportunity in the food sector than a butcher. Also prior knowledge in entrepreneurship can help the individual to identify opportunities. As skills, the individual needs to be able to seize, explore, and assess opportunities (Lee, Shim, & Lee, 2016). Additionally, the individual needs, for instance, skills that help him or her to communicate with others, and to build and use a network. Finally, individuals need the right attitude. Recall from the section on OIC that individuals with high alertness identify opportunities quickly as they have a critical attitude towards the market environment, and are able to estimate accurately the potential of a situation (Gaglio & Katz, 2001). As such, an alert attitude can help to identify opportunities. In the key competence of lifelong learning, sense of initiative and entrepreneurship, the competence components are defined as followed:

[T]he framework defines the necessary *knowledge* as relating to identification of suitable opportunities, economic/business context and understanding of the particular challenges that face the employer. Meanwhile, relevant *skills* refer to proactive project management, effective representation and negotiation skills and the ability to assess personal strengths and weaknesses. Ultimately, individuals with an *entrepreneurial attitude* take the initiative and are pro-active in both their personal and social lives and at work, and have the determination

to meet their objectives. (Komarkova, Gagliardi, Conrads, & Collado, 2015, p. 34)

CPS is positioned as a transversal, domain-unspecific skill (i.e., a skill that spans multiple domains; Wüstenberg et al., 2012). The main difference between CPS skills and OIC here is that in OIC, the knowledge and attitude component are a tangible part of the competence domain next to skills. For instance, domain-specific prior knowledge and entrepreneurial alertness explain OIC in a significant degree (Gaglio & Katz, 2001; Wang et al., 2013).

#### **2.4.4 What are prerequisites of OIC?**

Now that we have discussed the roots of problems, goals of OI and CPS, and the difference between competence domains and skills, we are interested in the following question: what components of CPS skills trigger OIC?

Entrepreneurial alertness is an important motive of individuals for identifying opportunities. On the basis of the theory about entrepreneurial alertness, it is relevant to investigate what sources contribute to higher alertness. According to Funke (2001), problem solvers actively acquire knowledge based on the assumption that information around them is incomplete or false (Dörner, 1989). Gaglio and Katz (2001) mention that ‘an alertness schema includes a dynamic that induces scepticism about information perceived and that questions, if not challenges, the initial frame of reference’ (p. 101). In accordance with the theories of OIC and CPS skills, alerted individuals reveal a higher eagerness to challenge information. Therefore, we argue that the individuals who question whether information around them is incomplete or false have high entrepreneurial alertness. This suggests that effective problem solvers and entrepreneurs share the ability to search for relevant, complete information, and that both have high alertness for the identification of opportunities.

Next to entrepreneurial alertness, there are also other factors that trigger OIC. For instance, the perception of industrial environmental opportunities relates to the opportunities for new product and technological innovation in the environment of an organisation (Wang et al., 2013). Factors more closely related to the individual are for instance prior knowledge, social networks, self-efficacy, flexibility, risk-taking, need for achievement, and locus of control (Rauch & Frese, 2007b). As the results of the research of Wang and colleagues (2013) show, the perception of industrial environmental opportunities, social networks, self-efficacy, and prior knowledge explain 35% variance

of OIC. Empirical research should point out whether these factors explain OIC to a higher, lower or equal extent compared to CPS.

#### **2.4.5 Ties and distinctions between the process models of OI and CPS**

The first stage of the opportunity production process (Wood & McKinley, 2010) includes opportunity objectification; in a complex problem the CPS process of knowledge acquisition enables problem solving. The OI process starts when an individual has an idea: an imagined, abstract representation of the future (Dimov, 2007a; Wood & McKinley, 2010). In CPS, the problem solver builds an actionable problem space filled with relevant information through the ongoing acquisition of knowledge. We consider this actionable problem space to be a prerequisite for the development of the abstract representation of the future.

An important distinction between OI and CPS is that in CPS, the problem situation and the desired goal state are given from the start (Dörner, 1976). However, opportunity objectification starts with a rudimentary idea (Dimov, 2007a). The further exploration of the idea might provide the set-up for a complex problem situation. This is only the case, if the further exploration of the idea leads to any (complex) problems. If not, CPS is not involved in the OI process and does not predict individual's performance in major ways. However, if an idea provides the set-up for a complex problem situation, the hypothesis would be that further development of the idea into a genuine opportunity is influenced by CPS.

The second stage includes opportunity enactment and knowledge application. Recall that opportunity enactment means that an individual shares the opportunity with relevant stakeholders and negotiates about the potential of it, in order to refine the opportunity (Wood & McKinley, 2010). From the perspective of the cognitive field, it is especially the corrective moments which explain the process of opportunity enactment. As mentioned before, corrective moments challenge the idea (or problem) representation of the problem solver (Ohlsson, 1992). Corrective moments occur when new information contradicts the existing problem space. The individual might adjust the idea representation based on these corrective moments, or, from an entrepreneurship perspective, based on the negotiation with relevant stakeholders.



## 2.5 Conclusion and the future research agenda

To get the most out of newly emerging, flexible, adaptive work environments present in daily working life, individuals need to be able to identify high potential opportunities. The “ability to identify available opportunities” (European Parliament and the Council of the European Union, 2006, p. 17) is even acknowledged as one of the key competencies for lifelong learning. Since some authors suggest that CPS might contribute to a better understanding of OI (Hsieh et al., 2007; Stevenson & Jarillo, 1990), we elaborated on the relation between OIC and CPS skills from a conceptual point of view. The cognitive and entrepreneurship research fields show several conceptual connections which lead us to the conclusion that CPS skills might explain variance of OIC, and hereby might contribute to a better understanding of the initial steps of entrepreneurship.

In summary, entrepreneurial problem solvers feel challenged to overcome complex problems, which they experience as an entrepreneurial challenge. The outcome of the OI process (i.e., value-creation) slightly differs from the outcome of the CPS process (i.e., solving a complex problem). Nonetheless, in both processes individuals aim to find successful strategies and to make the right decisions (Dunbar, 1998; Sarasvathy et al., 2010). When considering CPS as a skill, and OI as a competence domain, we argued that in OIC the knowledge and attitude component are more tangibly present. Furthermore, effective problem solvers, entrepreneurs, and intrapreneurs seem to share a critical attitude towards their environment, an ability to search for complete information, and a high alertness towards the identification of opportunities (Dörner, 1989; Kirzner, 1997). If the identification of a first, rudimentary idea provides the set-up for a complex problem situation, CPS is relevant for the further objectification of the idea into an opportunity and the development of the opportunity into a concrete prototype, plan, format, and so on (i.e., opportunity enactment). In opportunity enactment, the OI process involves so many complex and ambiguous elements (Pannekoek et al., 2005), that CPS skills could play a role in many different aspects of entrepreneurship that are to be defined in future research. In conclusion, we believe that the entrepreneurship and cognitive literature can benefit from one another on a conceptual level and that an empirical investigation of the relation between OIC and CPS skills could contribute to a more thorough understanding of the initial steps of the entrepreneurial process. This conclusion is in line with earlier research, in which the cognitive research field also offered concepts and techniques that enriched the entrepreneurship research field (Mitchell et al., 2002).

Our conceptual exploration leads us to the assumption that CPS skills might be a reliable predictor of OIC. Therefore, for future research, we recommend empirical exploration of the relation between OIC and CPS skills, and to which degree CPS skills can be regarded as a predictor of OIC. Since the CPS test has proven to be a valid, reliable assessment within an educational context, and there is no valid and reliable assessment available for OIC yet, employers could measure CPS, and even gain an impression of the opportunity capabilities of employees. Although research on CPS was commonly focussed on the school context, the first empirical evidence that CPS is relevant within the work-context as well is presented by (amongst others) Danner and colleagues (2011), and Kersting (2001), who point out that CPS predicts supervisor performance ratings. If empirical research supports that CPS is a reliable predictor of OIC, the relevance of CPS tests within a work context becomes even clearer. Also, this would provide more solid ground for OIC and strengthen it as a unique competence domain. In addition, in order to develop a complete model of the initial steps of entrepreneurship, future empirical research should include prior knowledge and other variables that might explain variance in OIC, such as social networks, divergent thinking skills and personality traits (Kirzner, 1997). Those variables might have a moderating or even mediating effect on the relation between CPS skills and OIC.

For empirical research purposes we suggest measuring OIC by confronting respondents with a problem case and asking them to enumerate as many ideas as possible. This assessment is in line with the core principles of the subjective basis of OIC: individuals have to construct ideas in interaction with the environment (i.e., the problem case; compare Fletcher, 2006). When comparing OIC and CPS skills in future research it is important to control for differences in assessment approach: the OIC assessment consists of authentic, entrepreneurial tasks, while the CPS assessment consists of tasks derived from daily-life. To further advance the notion of entrepreneurial competencies, OIC could be linked to personal, professional, and business outcomes, such as innovation or career success. Empirical research could be organised among professionals of several fields of expertise, such as students, self-employed people, and workers. As a start, the relation between OIC and CPS skills could be explored among students, as they are the professionals of the future.

In conclusion, we believe that CPS skills might predict OIC to a considerable degree. The empirical examination of this relation could contribute to a deeper understanding of the emergence of opportunities within recently founded and more mature organisations; this is desirable because entrepreneurship is necessary for generating high-potential start-ups and for maintaining competitive advantage

(Lumpkin & Dess, 1996). Moreover, we believe that CPS contributes to understanding how individuals can adapt to the transformations related to entrepreneurship at the workplace. The notion of lifelong learning is closely related to the fast changing work environment, in which being able to deal with entrepreneurial challenges has become a core task. The conclusion of this conceptual work supports the belief that CPS plays a role in dealing with those entrepreneurial challenges, and therefore we would argue that an extension of the exploration of CPS is highly relevant.

## **2.6 From theorising OIC to measuring OIC**

As stated in Chapter 1, the focus of the next chapters will be on OIC. CPS was the core construct of interest in the LLLight'in'Europe research project, of which the current PhD project was part. As argued in the conceptual work above, CPS skills are considered important in the context of entrepreneurship. Nevertheless, OIC is much closer related to entrepreneurial behaviour of employees. Therefore, it was decided to further elaborate on OIC and to, first of all, develop an instrument to measure OIC in such way that is called for, namely by developing an instrument that measures actual thinking or behaviour. As a suitable setting to apply a newly-developed measurement, the instrument was tested in higher education. Accordingly, in Chapter 3 the opportunity identification competence assessment test (OICAT) is introduced.



## CHAPTER 3

# Development and application of the opportunity identification competence assessment test (OICAT) in higher education<sup>3</sup>

3

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<sup>3</sup> This chapter is based on:

Baggen, Y., Kampen, J. K., Naia, A., Biemans, H. J. A., Lans, T., & Mulder, M. *Development and application of the opportunity identification competence assessment test (OICAT) in higher education*. Manuscript submitted for publication.

### **Abstract**

Developing and assessing individuals' competence to identify business opportunities is of increasing importance in the current widespread introduction of entrepreneurship programmes in higher education worldwide. However, performance tests to assess opportunity identification competence (OIC) are scarce in the entrepreneurship education literature. This study elaborates on the development and application of such a performance assessment tool: the opportunity identification competence assessment test (OICAT). The OICAT consists of two tasks relating to opportunity identification (i.e., business idea generation and business idea evaluation). This study investigated how bachelor's students, and master's students following entrepreneurial courses, identify opportunities. The results suggest that the OICAT is successful in tracking individual differences in OIC. The OICAT could be used as a learning-oriented assessment, helping students find out both what they already can do and what they need for further improvement.

### 3.1 Introduction

Entrepreneurship education (EE) in higher education is growing rapidly. More and more universities offer entrepreneurship courses, and the topic is high on the political agenda (Fayolle, 2013; Kuratko, 2005). Students developing entrepreneurial competencies are prepared for complex careers full of entrepreneurial projects, characterised by opportunities, risk of failure, innovation and iterative experimentation (Lackeus, 2015). One of those entrepreneurial competencies is opportunity identification competence (OIC). Opportunity identification (OI) is at the heart of entrepreneurship research (Shane & Venkataraman, 2000), as the entrepreneurial process always starts with the identification of potential opportunities that could be explored and further developed into a new product, service or process (Baggen et al., 2015).

In the current study EE is broadly defined as the “[c]ontent, methods and activities that support the development of motivation, skill and experience, which make it possible to be entrepreneurial, to manage and participate in value-creating processes” (Moberg, Barslund Fosse, Hoffman, & Junge, 2014, p. 14). This definition captures not only the process of starting a new business but also the learning, change and value-creation processes involved in entrepreneurship (see the report of the Organisation for Economic Co-operation and Development (OECD) by Lackeus (2015) for detailed background on EE).

As EE is rather young in both practice and research, it still faces several challenges (Fayolle, 2013; Martin, McNally, & Kay, 2013). One of those challenges relates to the limited amount of research on assessment in EE. Several studies have measured OIC using various instruments, such as self-assessments and interviews in which participants re-call previously observed opportunities (e.g., DeTienne & Chandler 2004; Ozgen & Baron, 2007; Ucbasaran, Westhead, & Wright, 2009; Wang, Ellinger, & Wu, 2013). Although these studies contribute significantly to our understanding of assessing OIC, scholars emphasise the limitations of these methods, arguing that these might not fully capture OIC because interviews and self-assessments measure perceptions, feelings and impressions, instead of actual behaviour (Corbett, 2007; Shepherd & DeTienne, 2005).

Therefore several authors (such as Gaglio & Katz, 2001; Shepherd & DeTienne, 2005) argue for the development of performance tests to assess OIC, to measure the actual thinking and behaviour of individuals. Performance assessments have been developed to measure related skills such as creativity (see for instance the Alternative Uses Task, Guilford, 1967), but not for OIC – which addresses a more specific

competence domain. Yet, performance assessments are congruent with modern ways of thinking about assessment in education. There is a clear need for assessments that help students develop entrepreneurial competencies by offering concrete insight in and feedback on the test results (Lans & Gulikers, 2010), referred to in the jargon as *assessment for learning* (Birenbaum et al., 2006).

Accordingly, the central research question of this study is: *What is a suitable instrument for assessing OIC?* The main aim of the present study, then, is to develop a performance test and apply it in two university student samples to investigate the OIC of individuals. This performance test is referred to as the opportunity identification competence assessment test (OICAT). Below is an elaboration on earlier research on opportunities, followed by an explanation of the OICAT.

### 3.2 Earlier research on opportunities

In entrepreneurship literature, opportunities and the process leading towards OI are approached as either objective or subjective (Renko, Shrader, & Simon, 2012). Whereas proponents of the objective view argue that opportunities are discovered in the economic environment (Kirzner, 1997; Renko et al., 2012), proponents of the subjective view maintain that opportunities are created by individuals (Fletcher, 2006; Wood & McKinley, 2010). These views are not mutually exclusive – other perspectives exist on the ontological roots of OIC (e.g., DeTienne & Chandler, 2004) – but they elaborate on different elements of the OI process. As Dutta and Crossan (2005) argue, one “needs to be able to reconcile or even to synthesize the apparently conflicting positions of the two ontological approaches” (p. 433). In this study, OIC is defined as “the ability of individuals to identify ideas for new products, processes, practices or services in response to a particular pain, problem, or new market need” (Baggen et al., 2015, p. 417).

In line with other scholars it is argued that an essential part of the OI process is *the generation of opportunity ideas*: initial ideas or envisioned futures in the mind of an individual (Lumpkin & Lichtenstein, 2005; Wood & McKinley, 2010). The nature of these ideas is closely related to the prior knowledge and experience of an individual (Arentz, Sautet, & Storr, 2013; Shane, 2000). Furthermore, idea generation is recognised as being a domain-specific form of creativity (Ucbasaran et al., 2009; Ward, 2004). Creative individuals are able to link relevant information and are sensitive to valuable, unique information. Creativity can help in coming up with a new opportunity, but creativity might be hindered by basic knowledge structures that constrain creative imagination (Ward, 2004).



Beyond explaining OI in terms of individuals' knowledge and skills, scholars aim to explain it in terms of the cognitive processes underlying OI (Baron & Ensley, 2006; Santos, Caetano, Baron, & Curral, 2015). Based on experience, individuals develop frameworks which help them to interpret new and seemingly independent situations, and to "connect the dots" (Baron & Ensley, 2006, p. 1341) between them. This implies that individuals develop cognitive frameworks for identifying business opportunities. An individual with an idea compares this idea to the developed framework in order to estimate its potential. To test their cognitive reasoning, Baron and Ensley (2006) asked novice and experienced entrepreneurs to describe the idea on which their new venture was based, and also, "Why did you feel this was a good idea – one worth pursuing?" (p. 1334). Based on the results, they designed frameworks of experienced and novice entrepreneurs to indicate how they identify business opportunities. The experienced entrepreneur framework was clearer, richer in content and focussed on elements directly related to actually starting a business. Novice entrepreneurs tended to focus more on the "newness" or "uniqueness" of ideas.

### 3.3 Methods

The OICAT consists of two tasks: Task 1 relates to business idea generation (BIG) and Task 2 to business idea evaluation (BIE). BIG relates to the ability of individuals to use their creativity and generate business ideas, and BIE relates to the cognitive frameworks individuals use to evaluate business ideas' potential success. To develop the OICAT in a systematic way, three steps have been taken. First, to ensure face-validity, a preliminary version of Task 1 BIG was piloted among 130 Dutch master's students in social and natural sciences; this led to several improvements and amendments concerning Task 1. Secondly, because of the explorative character of this study, the OICAT was further developed and applied in two distinct samples: students with and without a direct affinity for entrepreneurship. This yielded rich insight into the results the OICAT provides and whether or not the test generates different results over samples. The OICAT was applied to Dutch master's students, referred to as Trial A; this led to a few minor changes, as Task 2 as applied in Trial A has not been part of the pilot. These changes were implemented in Trial B. Then the OICAT was applied to Portuguese bachelor's students, referred to as Trial B. Thirdly, the correlation between the Trial A and Trial B samples was tested with respect to the two indicators. In addition, to test for convergent validity of the OICAT against existing instruments, the results were correlated with self-perceived OIC (see the introduction of this chapter). Finally, the relationship between Task 1 BIG and Task 2 BIE was examined.

### 3.3.1 Sample

The Dutch sample (Trial A) was a convenience sample of 115 master's students in the life sciences domain. The students took a course on career development and planning or entrepreneurship in which they could orient themselves to an entrepreneurial career by actively exploring the first steps of the entrepreneurial process. The study programme of these students was related either to natural sciences (80.7%) or social sciences (19.3%). The average age was 23.5 years ( $SD = 1.97$ ). The majority (70.6%) were female. Trial B was a convenience sample of 142 first-year Portuguese bachelor's students studying Psychomotor Rehabilitation (31.7%), Dance (9.9%) or Sport Sciences (58.4%). The average age was 19.2 years ( $SD = 3.48$ ); 51.5% were female. At the moment of testing the students had just started their studies and did not take courses on entrepreneurship.

### 3.3.2 Procedure

Tests were administered in class, with prior permission from the lecturer, in May 2014 in the Netherlands (Trial A) and September 2014 in Portugal (Trial B). After a short introduction, stressing the anonymity and confidentiality of data and explaining the procedure, the participants signed a declaration of consent and then began to work on the OICAT. Participants were warned when half of the time had passed and when they had only one minute left. As soon as the time had elapsed, the next task was distributed. After the OICAT, Trial A students completed a questionnaire including a scale for self-perceived OIC; due to time restrictions, Trial B students did not.

### 3.3.3 Instrument development

#### *Task 1 Business idea generation (BIG)*

The point of departure was an instrument developed and applied by Corbett (2007) to measure BIG as an indicator for OIC. Corbett asked participants to generate business ideas related to (Bluetooth) technology. As technology-based entrepreneurship is a specific domain of entrepreneurship – it does not appeal to a diverse group of individuals (e.g., social sciences) – a broader topic was selected that is familiar to many people. This topic was sustainable development, of which the definition was derived from the knowledge platform on sustainable development of the United Nations (see <https://sustainabledevelopment.un.org/>): “[d]evelopment that meets the need of the present without compromising the ability of future generations to meet their own needs”. An explanation was provided what sustainable development is about and

several specific examples were given, such as energy, climate change, and education. The participants were asked: “Imagine that you are asked to give input for business ideas for new start-ups in the area of sustainable development. These business ideas can concern people, planet and/or profit, and may lead to social, environmental and/or economic gains. What ideas for new start-ups come up in your mind?” A start-up was defined as a new independent venture or new project within an organisation. Furthermore, it was stressed that “You do not have to worry about whether the ideas have a high or low potential for success. Do not limit yourself; the more ideas you can list, the better”. Participants had ten minutes to read the case and write down their business ideas.

The ideas generated were scored based on a classification by Guilford (1967), who formulated three factors to score the competence of creative individuals: fluency, elaboration, and flexibility:

- (1) Guilford (1967) refers to *fluency* as the quantity of responses that fulfil the specifications as formulated in the question. The ideas were scored for comprehensibility (1 = comprehensible, 0 = incomprehensible). For instance, “3-D printing” was too vague to interpret in the context of sustainable development and as a start-up. Incomprehensible ideas were excluded from further analysis.
- (2) Originally, *elaboration* refers to the amount of detail in participant responses (Guilford, 1967). Because scoring elaborateness of business ideas appeared too ambiguous, ideas were scored for concreteness: the degree to which it was possible to visualise or apply the idea (1 = concrete, 0 = not concrete). The proportion of concrete ideas per participant was calculated: the percentage of comprehensible ideas that were concrete.
- (3) The *flexibility* score indicates to what degree participants generated ideas in different categories. For instance, the ideas “use solar energy” and “wear an extra sweater and turn down the heating” are both related to energy. The ideas “use local products in the canteen” and “reuse clothes” relate to different categories, indicating higher flexibility. The categories were based on the examples of sustainable development in the problem case (see Table 3.1 for an overview). Each idea was scored into one category. The formula for calculating the flexibility score was: number of scored categories / maximum number of categories (6).

The Trial A data were used to develop the codebook and to calculate the inter-rater reliability. The level of agreement was calculated for the dichotomous variables (comprehensibility and concreteness), and Cohen’s kappa for flexibility. Two scholars from the team of authors scored 10% (about 75) of the ideas, which is an acceptable

procedure for rating such a substantial dataset (Hallgren, 2012). They discussed their results, refined the codebook and repeated this procedure twice, until the measures of inter-rater reliability yielded acceptable levels: Cohen's kappa of .78, and agreement of 82.9% (concreteness) and 94.7% (comprehensibility). A "miscellaneous" category was created for the ideas that did not align with the assignment at all. Subsequently, the first author scored the complete results of Trial A, and a student assistant speaking Dutch, English and Portuguese did the same for Trial B using the final codebook.

#### *Task 2 Business idea evaluation (BIE)*

For the development of Task 2 the frameworks of novice and experienced entrepreneurs formulated by Baron and Ensley (2006) were used. Participants received a list with ten arguments (see Table 3.2) directly derived from these frameworks. More specifically, five arguments were derived from the framework of a novice entrepreneur, and five of the framework of the experienced entrepreneur. Participants in Trial A were asked to *rank* the arguments, and in Trial B to *select* five arguments according to their importance when determining the potential success of business ideas. Participants worked on Task 2 for six minutes (Trial A) or five minutes (Trial B). As shown in Table 3.2, some arguments were changed for Trial B, due to confusion about their meaning. These were processed in close collaboration with an expert in the field of entrepreneurship. The score for BIE was computed in Trial A as the percentage of expert arguments placed in the top five, and in Trial B as the percentage of expert arguments selected<sup>4</sup>.

#### *Measuring self-perceived opportunity identification competence*

A three-item scale previously applied by Wang and colleagues (2013) and Ozgen and Baron (2007) was used to measure self-perceived OIC in Trial A: "Seeing potential opportunities does not come very naturally to me" (reverse scoring); "I have a special alertness or sensitivity toward new opportunities"; and "While going about routine day-to-day activities, I see potential new venture ideas all around me". The participants responded on a five-point Likert scale. Internal consistency of the scale was determined by principal components analysis with varimax rotation. The test showed that the three items measured one single dimension (loadings ranged between .65 and .85). The Cronbach's alpha (.68) was calculated as an indication for the reliability of the scale. As Wang and colleagues (2013) found a Cronbach's alpha of .80 for the same scale, the lower Cronbach's alpha found in this study was accepted.

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<sup>4</sup> For the complete OICAT, please contact Yvette Baggen: yvettebaggen@gmail.com.

### 3.4 Results

Table 3.1 shows descriptive statistics for OICAT Task 1, BIG.

Table 3.1

*Mean Scores and Standard Deviation for OICAT Task 1, BIG*

Characteristic BIG	Trial A (n = 115)		Trial B (n = 142)	
	M	SD	M	SD
No. ideas generated	6.43	3.61	2.28	1.48
No. comprehensible ideas	6.25	3.53	2.24	1.44
No. concrete ideas	5.72	3.19	1.89	1.35
No. flexible ideas	3.14	1.08	1.70	.80
Categories				
Food	.87	1.07	.19	.43
Decent housing	.25	.58	.14	.38
Energy	1.12	1.29	.43	.74
Climate change	2.24	2.03	.85	.97
Education	1.39	1.44	.19	.51
Personal health and safety	.50	.84	.44	.73
Miscellaneous			.12	.42

In total, the 115 Trial A participants generated 719 comprehensible ideas. On average, 92% of a participant's comprehensible ideas were also concrete (i.e., visualisable and/or applicable), and each participant generated ideas in about three out of six different categories. For instance, the Trial A participants generated on average 6.25 comprehensible ideas of which 1.12 were about energy. In Trial B the 142 participants generated 313 comprehensible ideas. On average, 84% of a participant's comprehensible ideas were also concrete, and each participant generated ideas in nearly two out of six categories. For instance, the Trial B participants generated on average 2.24 comprehensible ideas of which .19 were about food. Trial A participants produced significantly more comprehensible ( $t=-11.45$ ,  $df=145.2$ ,  $p<.001$ ) and concrete ( $t=-2.16$ ,  $df=223.99$ ,  $p=.032$ ) ideas belonging to more categories ( $t=-11.77$ ,  $df=201.12$ ,  $p<.001$ ) than did Trial B participants.

Table 3.2 presents the percentage of participants that selected each argument of OICAT Task 2, BIE.

Table 3.2

*Percentage of Participants That Selected Each Argument for OICAT Task 2, BIE (Trial A: in Top Five; Trial B: From Selection of Five Arguments)*

Argument	% Trial A (n = 111)	% Trial B (n = 142)
Framework experienced entrepreneur		
Solving a customer's problem	77.4	89.4
Ability to generate recurring revenues (Trial A: Ability to generate positive cash flow)	66.1	71.8
Manageable risk	50.4	22.5
Existence of an ecosystem (other companies, systems) with whom to develop the idea (Trial A: Others in your network with whom to develop the venture)	37.4	47.2
Cost of customer acquisition (Trial A: Speed of revenue generation)	35.7	43.7
Framework novice entrepreneur		
Superiority of product/service	67.0	49.3
How novel the idea is	52.2	42.3
Intuition or gut feeling	40.0	16.2
Potential to change the industry	31.3	59.2
Extent to which idea is based on new technology	25.2	31.0
Pct. arguments in line with framework of experienced entrepreneur	55	55

The participants from both trials scored slightly more in line with the framework of the experienced entrepreneur (55%) than of the novice entrepreneur. The results between Trail A and B for Task 2, BIE did not differ significantly ( $t=-.16$ ,  $df=251$ ,  $p=.870$ ).

With respect to possible relationships between OICAT Task 1 and Task 2, and self-perceived OIC (tested only in Trial A), Kendall coefficients indicate insignificant relationships (all  $p > .05$ ). The same test showed that the correlation between OICAT Task 1 and Task 2 was non-significant in both trials ( $p > .05$ ).

### 3.5 Discussion and conclusions

Because of limitations in existing self-assessment instruments, and the need for performance assessments in EE, the main aim of the current study was to develop and apply the OICAT in two university student samples. Four main conclusions can be drawn from the findings.

First, the master's students (Trial A) scored significantly higher than the bachelor's students on all aspects of OICAT Task 1, BIG. The differences in comprehensibility, concreteness and flexibility suggest that OICAT Task 1 can be used to track individual differences in OI. The participants from Corbett's (2007) study generated on average 3.79 ideas in "a few minutes" (p. 107). In comparison, the master's students generated a relatively high number of ideas (6.25) – even though they had ten minutes for the task. A possible explanation for this higher score is that they participated in entry courses in entrepreneurship. Moreover, as master's students in the life sciences they had considerable prior knowledge of sustainable development. Prior knowledge plays a significant role in OI (Arentz et al., 2013; Shane, 2000).

Secondly, with regard to Task 2, participants from Trials A and B scored slightly more in line with the framework of the experienced entrepreneur. Santos and colleagues (2015) studied underlying dimensions of the frameworks and concluded that viability (i.e., solving customers' problems, generating profit, and manageable risk) and distinctiveness (i.e., superiority of the product and its potential to change the industry) are two essential dimensions of OI. As the participants from both trials selected four out of five aspects related to these dimensions, they do seem to recognise the importance of viability and distinctiveness in OI. Although one can argue that most university students probably have not yet developed full frameworks for OI, Task 2 does not seem to differentiate here.

Thirdly, to examine the convergent validity of the OICAT, self-perceived OI of the participants from Trial A was compared with the scores of Task 1, BIG and Task 2, BIE. No correlation was found. A possible explanation for this finding is that authors who used the scale (e.g., Ozgen & Baron, 2007; Shane & Nicolaou, 2015; Wang et al., 2013) only refer to statistical criteria for its use, but not to external criteria such as a validation by experts in entrepreneurship. Therefore, it remains unclear whether the self-assessment truly correlates to OI.

Finally, the results show that BIG and BIE were not correlated. This finding suggests that for some individuals it is easier to generate ideas and for others it is easier to recognise which ideas have the most opportunity potential. Guilford (1967) supports this finding and argues that evaluators are eager to evaluate and further develop half-defined ideas into successful business opportunities or solutions for problems, while business idea generators prefer to generate ideas without any limitations. Apparently, in early stages of entrepreneurship, individuals with different competencies are needed.

### 3.5.1 Theoretical and practical implications

Theoretically, the results support the claim made by many scholars that the opportunity process consists of distinct sub-processes (e.g., Wood & McKinley, 2010), in the current study operationalised as BIG and BIE. Furthermore, no correlation was found between self-perceived OIC and OICAT. This result questions the effect-claims made in EE studies which use broad self-perceived measures of OIC. As such, the results of this study support the need expressed by researchers for more rigorous measures and designs in EE research (e.g., Martin et al., 2013; Shepherd & DeTienne, 2005).

Practically, the OICAT may be used in higher education as a learning-oriented, formative assessment providing insight into current competencies and competencies needing further development, allowing students to formulate personal, specific learning goals related to those aspects needing improvement (Birenbaum et al., 2006; Lans & Gulikers, 2010). Additionally, by reflecting on OICAT results with others (e.g., peers or teachers), students can improve their understanding of the crucial competencies needed in the early stages of entrepreneurship.

### 3.5.2 Limitations and directions for future research

First, in terms of design regarding Task 1 (BIG), the ten minutes to generate ideas may have resulted in the formulation of (too many) analytical as opposed to insightful answers (see for instance Salvi, Bricolo, Kuonios, Bowden, & Beeman, 2016). In future research, participants could be given less time to generate ideas. Regarding the design of Task 2 (BIE), this task differed somewhat between Trial A and Trial B. In future research Task 2 should consistently be applied as used in Trial B. Moreover, to control for any other effects the OICAT should be applied simultaneously but analysed separately.

Second, though a self-assessment of OIC was used in the current study to investigate convergent validity of the OICAT, the data showed no correlation. To further explore convergent validity, it is important to investigate potential explaining variables underlying OIC, such as prior knowledge, cognitive style or creativity.

Third, in the present study two samples differing in several aspects (e.g., country, age, background, educational level, gender) were used to test the OICAT, which was valuable to examine whether the OICAT generates different results over groups. For future research comparable groups should be used to examine the discriminant validity of the OICAT. For instance, the OICAT could be applied among novice, serial or habitual entrepreneurs as well as employees working for existing companies. These

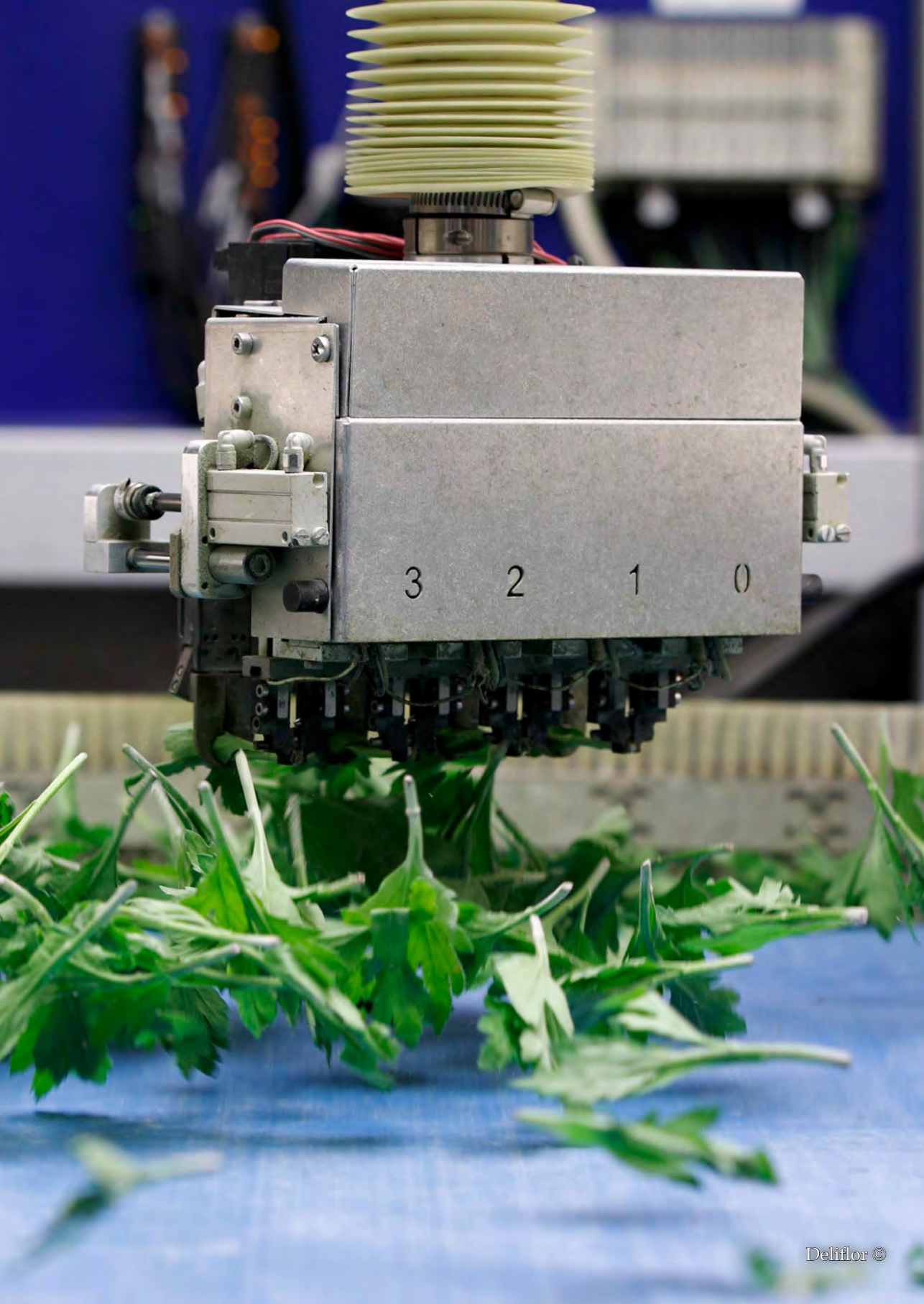


different groups may score differently on the OICAT, as their cognitive framework for judging opportunities may be developed differently (Baron & Ensley, 2006; Corbett & Hmieleski, 2007). In addition, because entrepreneurship is increasingly considered a team activity (e.g., Dutta & Crossan, 2005), it would be interesting to develop a group instrument for OIC.

In conclusion, some challenges should be addressed to further develop the instrument, such as proving its convergent validity. Nevertheless, the results of the current, explorative study are promising, as they suggest that the OICAT is a suitable instrument to measure OIC, that it can be used to track individual differences in OIC, and that OICAT is a useful instrument for both empirical research and practice.

### 3.6 From measuring OIC to explaining OIC in SMEs

The results of Chapter 3 provide insight into the different competencies involved in OIC (namely BIG and BIE). Some individuals might prefer to generate business ideas, while others might prefer to evaluate their potential success. Furthermore, the results show that individuals do not have OIC to the same extent (i.e., some individuals are able to generate more ideas than others). In Chapter 4, OIC of employees is investigated in the context of existing firms. Here, the focus is on *explaining* OIC of individual employees by investigating personal and organisational level antecedents that influence OIC.



## CHAPTER 4

# Fostering entrepreneurial learning on-the-job: Evidence from innovative small and medium-sized companies in Europe<sup>5</sup>

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<sup>5</sup> This chapter is based on:

Baggen, Y., Lans, T., Biemans, H.J.A., Kampen, J., & Mulder, M. (2016). Fostering entrepreneurial learning on-the-job: evidence from innovative small and medium-sized companies in Europe. *European Journal of Education*, 51, 193-209. doi:10.1111/ejed.12171

### **Abstract**

As economies become more innovation-driven, the need for entrepreneurial behaviour amongst employees working for existing companies increases in order to enhance the organisations' capacity to develop new ideas, products and services. Hence, entrepreneurial learning and the development of entrepreneurial competencies of employees on-the-job become more important. One of the most crucial competencies in this regard is the ability to identify potential business opportunities, referred to as opportunity identification competence (OIC). In this empirical study, antecedents of OIC were investigated in a small and medium-sized business context. Based on the 3-P (i.e., presage, process, product) model, specific learner, work environment, and process factors influencing OIC as an outcome variable were studied. More than 200 employees from 12 companies completed a questionnaire. Results of a backward regression analysis underline the importance of investing in programmes that focus on entrepreneurial learning at the shop floor level, trusting employees that they are capable of actively participating in the early stages of innovation and the crucial role of owner-managers to support entrepreneurial employee activities.

## 4.1 Introduction

The interest of EU policymakers in ways to promote entrepreneurial learning has been growing in the last few decades. This interest has grown, on the one hand, because of the large number of independent entrepreneurs: the Global Entrepreneurship Monitor (GEM) indicates that almost one out of ten European citizens is thinking about starting or is taking initial steps to start their own business (Amorós & Bosma, 2014). On the other hand, there is an increasing group of employees that is taking the lead in Entrepreneurial Employee Activities (EEA) in existing firms: “Employees developing new activities for their main employer, such as developing or launching new goods or services, or setting up a new business unit, a new establishment or subsidiary” (Bosma et al., 2013, p. 7). Figures from the GEM in 2011 suggest that the group of entrepreneurial employees concerns almost 5% of the European adults (Bosma et al., 2013) and this number is increasing as economies become more innovation-driven. As such, it is no coincidence that one of the key competencies as identified in the European Reference Framework on Lifelong Learning is a sense of initiative and entrepreneurship (European Parliament and the Council of the European Union, 2006), emphasising that entrepreneurship is more than venture creation.

Despite the growing interest in entrepreneurial learning, research on this topic is still in its infancy, starting as from the 1990s. Although significant advancement has been made, there are still many research issues in this field that warrant attention. Firstly, research on entrepreneurial learning is rather fragmented. Secondly, studies on entrepreneurial learning have been criticised for focusing solely on the entrepreneurial individual, neglecting that entrepreneurial learning is very often socially-mediated and situated learning (Dimov, 2007a). Thirdly, the field has mostly benefitted from conceptual work. Empirical work is scarcer, especially with regard to a focus on (promoting) entrepreneurial learning within the context of existing organisations, such as entrepreneurial learning of employees (de Jong, 2013).

Recently, the EU stated in its Europe 2020-strategy that adult learning was an important way to promote entrepreneurship amongst employees. Hereby, (social) innovation and creativity are stimulated, and it is an important answer to (youth) unemployment and social exclusion (Council of the European Union, 2011). Furthermore, most firms are small and medium-sized (SMEs; Muller, Gagliardi, Caliandro, Bohn, & Klitou, 2014), with often no or hardly any human resource structures in place to systematically stimulate entrepreneurial learning amongst their employees. As most research focuses on large companies, it remains unclear which factors stimulate entrepreneurial learning in SMEs (Politis, 2005). Therefore, more

insight into these factors is needed and will help policymakers in addressing (some of) the overarching European challenges with regard to stimulating entrepreneurial learning in an SME context.

This article begins by unfolding the conceptual boundaries of entrepreneurial learning, by elaborating upon what and how entrepreneurs learn. Then, relevant antecedents and outcomes of entrepreneurial learning in the workplace are described and discussed. Next, the antecedents of entrepreneurial learning are further illustrated by an empirical study among more than 200 employees in 12 SMEs, covering individual aspects, as well as aspects related to the level of the organisation and work environment.

## 4.2 The role of education and learning in the entrepreneurial process

With growing attention given to promoting entrepreneurship in the policy realm, research on entrepreneurship education and entrepreneurial learning is becoming more and more relevant. As Minniti and Bygrave (2001) state: “entrepreneurship is a process of learning, and a theory of entrepreneurship requires a theory of learning” (p. 7). Therefore, in order to understand the entrepreneurial process, it is important to grasp *what* and *how* entrepreneurs learn (Wang & Chugh, 2014).

In defining *what* entrepreneurs should learn, research has shown that a great variety of competencies plays a role in the entrepreneurial process, such as strategic, relational, organisational and analytical competencies (Lans, Verstegen, & Mulder, 2011; Man, Lau, & Chan, 2002). In the context of entrepreneurial learning, authors particularly mention the ability to identify entrepreneurial opportunities (Politis, 2005), referred to as opportunity identification competence (OIC). The concept of entrepreneurial opportunities was popularised by the article of Shane and Venkataraman in 2000 to provide the research field of entrepreneurship its own intellectual identity (Venkataraman, Sarasvathy, Dew, & Forster, 2012). Despite its importance, scholars tend to disagree on what entrepreneurial opportunities comprise. Some argue that opportunities are objective entities, waiting to be discovered in the economic environment. From this point of view, entrepreneurs are *sensing learners*: practical thinkers who search for opportunities, set goals, scan the environment, analyse competition, and make strategic plans (DeTienne & Chandler, 2004; Wang & Chugh, 2014). Others argue that opportunities are socially constructed entities, created by entrepreneurs in interaction with their environment (Companys & McMullen, 2007). From this more subjective point of view, entrepreneurs are *intuitive learners*: abstract thinkers who act upon their environment, create market conditions, collaborate, and

negotiate with others (DeTienne & Chandler, 2004; Wang & Chugh, 2014; Wood & McKinley, 2010).

Recently, scholars have tended to reconcile these two perspectives and acknowledged that opportunities could both be discovered and constructed: “opportunities may be of several different kinds – some obvious and easily recognized, others more subtle and not so easily discovered, and yet others nonexistent until people set out to make them from unexpected ingredients” (Venkataraman et al., 2012, p. 25). Hence, both sensing and intuitive learning play a role in the entrepreneurial process. The attention given to entrepreneurial opportunities in the literature and the debate on this topic show the desire to understand how entrepreneurial opportunities are identified and acted upon, as well as the complexity of the learning process underlying it (Politis, 2005).

Concerning the question of *how* entrepreneurs learn, Wang and Chugh (2014) summarise in their study that entrepreneurs learn by doing, experience, trial-and-error, participation, and the experience of others. Learning and working are difficult to separate in entrepreneurial learning, since learning is often unstructured, unintentional and not always recognised as such, being a concurrent process to working (Eraut, 2004). What seems to be clear from recent entrepreneurial learning literature is that learning-related activities associated with the ongoing entrepreneurial process are neither exclusively individual, nor exclusively social, but a combination of both (Cope, 2005; Dimov, 2007a, 2007b; Dutta & Crossan, 2005). Also, critical incidents or episodes seem to be important triggers for entrepreneurial learning (Cope, 2005; Cope & Watts, 2000; Lans, Biemans, Verstegen, & Mulder, 2008). Examples include financial problems, exit of key staff, acquiring new customers or innovating new products.

The fact that entrepreneurial learning is often unstructured, informal and unintentional does not mean that there is nothing to “organise” in terms of entrepreneurial learning. Literature on entrepreneurship education (EE), which centres around the effectiveness of EE programmes, is helpful here. Although the field is rather young and it is still difficult to tell whether EE is effective, the first, general impression is that it does work (Rideout & Gray, 2013). In a recent exercise carried out by the European Commission, in which 91 studies on EE in 23 countries were analysed, it was concluded that there was a positive impact of EE on all sorts of outcomes, such as the development of specific motivations (e.g., future engagement in entrepreneurship), knowledge, skills and attitudes, and employability and career ambitions (Curth, 2015). Scientific studies on EE mainly focus on factors that influence the development of entrepreneurial intentions as predictors for entrepreneurial behaviour (Krueger, Reilly,

& Carsrud, 2000). Recent meta-analyses in this field show overall small but positive effects of EE on entrepreneurial intentions (Bae, Qian, Miao, & Fiet, 2014; Martin, McNally, & Kay, 2013). Also, entrepreneurial competencies, such as OIC, can be improved by offering educational activities. For instance, DeTienne and Chandler (2004) showed that training could enhance the number and innovativeness of ideas identified by students. Comparable effects of EE on students' OIC were reported by Karimi, Biemans, Lans, Aazami, and Mulder (2014).

#### 4.2.1 3-P model: factors influencing entrepreneurial learning of employees

The need for employees with an entrepreneurial orientation within existing organisations has been stressed in the work on corporate entrepreneurship or intrapreneurship (Guth & Ginsberg, 1990; Lumpkin & Lichtenstein, 2005). Sharma and Chrisman (2007) define corporate entrepreneurship as “the process whereby an individual or a group of individuals, in association with an existing organization, create a new organization or instigate renewal or innovation within that organization” (p. 92). They state that it does not exclusively focus on innovation, but also includes (1) the birth of new firms within or adjacent to the existing organisation and (2) strategic renewal, for example, changing the key ideas on which the organisation is built (Sharma & Chrisman, 2007).

As stated in the introduction, a large group of entrepreneurial learners hardly profits from organised learning activities. Specifically, for employees working in SMEs it is often difficult to organise such learning activities, given the size of the company. However, their work environment is an important and powerful site for learning, and also for developing entrepreneurial competence. Several scholars tried to explain how an entrepreneurial work environment could be created and fostered, and what employees in all kinds of functions and roles needed in order to become entrepreneurial employees (Bosma et al., 2013; Holman et al., 2012; Wang, Ellinger, & Wu, 2013). In this regard, a helpful model to structure learning factors is the 3-P (presage-process-product) model, originally introduced by Biggs (1993). Although it was originally developed to map the complexity of learning in a school context, Tynjälä (2013) slightly adjusted and used it in the context of workplace learning. Following Tynjälä (2013), presage factors are seen as learner and work environment factors, process factors as work activities that foster learning, and product factors as learning outcomes.

To start with *product*, as stated, opportunity identification (OI) is a crucial outcome of entrepreneurial learning and is at the heart of the entrepreneurship literature (Shane



& Venkataraman, 2000). Therefore, the capability of employees to identify entrepreneurial opportunities (i.e., OIC) is the learning outcome of interest in this article. OIC is defined as “the ability of individuals to identify ideas for new products, processes, practices or services in response to a particular pain, problem, or new market need” (Baggen et al., 2015, p. 417). In this definition, opportunities initially are ideas, which Davidsson (2015) referred to as *new venture ideas* (i.e., “imagined future ventures”, p. 7). OIC refers to being able to generate new business ideas or, in other words, to think of *potential* opportunities whose exploitation could lead to value-creation.

From a *presage* point of view, prior experience in entrepreneurship is considered important, as scholars seem to agree that entrepreneurs mainly learn from experience (Harrison & Leitch, 2005; Politis, 2005). Studies from EE show that several learner factors, such as self-efficacy, influence the development of entrepreneurial intentions as predictors for entrepreneurial behaviour (Krueger et al., 2000; Rideout & Gray, 2013). In a business context, employees’ creative self-efficacy is considered crucial to realise innovations (Tierney & Farmer, 2011). Also, the study by Wang and colleagues (2013) showed that self-efficacy was one of the most important predictors of entrepreneurial opportunity recognition in the work context. Furthermore, they confirmed that social networks influenced (research and development) employees’ opportunity recognition. Interpersonal, social networks help to receive diverse and accurate information on opportunities, thus contributing to the successful identification of opportunities (Wang et al., 2013).

At the work environment (company) level, several studies focus on the importance of job design and openness to interaction with the external environment (Hornsby, Kuratko, & Zahra, 2002; Jones & Macpherson, 2006; Lans et al., 2008). With regard to job design, Holman and colleagues (2012) studied the influence of job control and problem demand on employees’ innovativeness in manufacturing firms. Job control was analysed as the extent to which employees had discretion over how they would prefer to do their job. It contributes to employees’ intrinsic motivation and enables them to independently select the most appropriate solution for a given problem situation (Holman et al., 2012; Hornsby, Kuratko, Shepherd, & Bott, 2009). Problem demand was seen as the frequency and difficulty of task problems. It prevents employees from solely focusing on effective task performance and challenges them to solve problems in new ways. Holman and colleagues (2012) found that both factors had an indirect association with idea generation through work-based learning strategies. Concerning the importance of the industrial environment, Wang and colleagues (2013)

found that the employees' perception of environmental opportunities was the most important predictor of OI, compared to four other antecedents related to the individual (such as self-efficacy). How employees perceive the companies' industrial environment, recognise threats and opportunities, and experience change and uncertainty in their environment seems to be relevant for exploiting the learning potential of the work environment (Hornsby et al., 2009; Wang et al., 2013).

For the *process* part of the model, Tynjälä (2013) refers to the work activities that foster learning processes, such as learning by doing. Several studies in the field of workplace learning emphasise the importance of work activities as vehicles for all sorts of work-related learning outcomes, including task performance, role performance, team work, awareness, understanding, decision-making and problem solving (Eraut, 2004). Similarly, studies on entrepreneurial learning stress the importance of learning by doing (Cope, 2005). In 2011, the GEM investigated Entrepreneurial Employee Activity (EEA) worldwide to get a better grip on corporate entrepreneurship (Bosma et al., 2013; see the introduction of this chapter). As the GEM results show, employees actively involved in innovation-related activities are far more likely to identify potential opportunities. According to Eraut (2004), important work-related activities can be grouped as 1) team work and working alongside others, 2) working with significant external stakeholders (e.g., clients), and 3) dealing with challenging tasks. In order to explore new ideas, to construct language and meaning in the organisation of potential new business ideas, new ideas must be shared with others. In the jargon: the potential business opportunity needs to be "objectified" (Dutta & Crossan, 2005; Wood & McKinley, 2010). Although the entrepreneurship literature has long emphasised the "heroic individual", there is an increasing amount of empirical evidence that supports the notion of significant peers, especially in the early stages of entrepreneurship. For instance, it is estimated that over 84% of the innovative projects use multifunctional teams (Griffin, 1997). Moreover, there is a direct link between team work and entrepreneurial performance (e.g., innovation), be it independent start-ups or corporate entrepreneurship projects (Vyakarnam & Handelberg, 2005). Besides learning internally about the new idea, business opportunities often grow and need to be validated in interaction with the external environment (Wood & McKinley, 2010). Work activities that include engagement in networks of external relationships, immersion within the industry (e.g., attending conferences, business visits) are all recorded as powerful learning-related work activities in small firms (Billett, 2011; Fenwick, 2003; Mulder, Lans, Verstegen, Biemans, & Meijer, 2007; Rae, 2006). In the continuing process of opportunity enactment, the support of external stakeholders becomes even more

prominent. It requires activities such as setting up small experiments, prototyping and observation. This will inevitably lead to the challenging of earlier assumptions around the idea and to solving existing and emerging problems in the trajectory to realising the business idea.

To sum up, earlier work carried out in the field of entrepreneurial learning and education provides clear evidence of the importance of entrepreneurial learning in an SME context for different learning outcomes, such as entrepreneurial intentions and competencies. To further illustrate this, in this study it is explored how entrepreneurial employees learn and what specific factors contribute to an exemplary learning outcome of entrepreneurial learning, namely OIC. In short, the research question is as follows: *What are antecedents of individual OIC (as an outcome of entrepreneurial learning) in a small and medium-sized business context?*

## 4.3 Methods

### 4.3.1 Participants

In total, 234 employees from 12 SMEs participated in this study. The companies were mainly active in the agricultural, food, and paper industry. All the companies had an affinity for innovation, as a strict requirement for participation was that they had introduced at least one new product or service in the previous three years. One company was from a different industry, the metal industry. Although this is a different sector, it was included because it was comparable with the other organisations in terms of organisation and innovation structure, size, and educational level. The same holds for the German company (the other 11 companies were Dutch). Furthermore, some of the companies were rather large (see company numbers eight and 11 in Table 4.1), and did, strictly speaking, not meet the definition of an SME (i.e., 10-249 employees according to the definition of the European Commission, 2015<sup>6</sup>). Despite the relatively large number of employees, the participation of the companies was considered acceptable for several reasons. First of all, because they met the criteria of having introduced at least one innovation in the previous three years. Secondly, because these companies experienced difficulties to systematically stimulate entrepreneurial learning amongst their employees. Thirdly, because these companies experienced an urgent need to act entrepreneurial as a driver of competitiveness, and aimed to commit all their employees in contributing to entrepreneurship. The second and third reason are

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<sup>6</sup> Other definitions exist, for instance in the United States of America where SMEs are firms with a maximum of 500 employees.

the main drivers for the interest in this study in entrepreneurial learning in existing firms, and are considered characteristic for the difficulties and challenges that are often present in SMEs (but not limited to SMEs).

To gain insight into the innovative and learning capacity of each organisation as a whole, employees in all kinds of functions and roles were invited to participate in the study: members of the management team, employees from marketing, human resources, support, and employees working in the factory or at the shop floor level. It was recommended to invite a mix of employees in terms of age, gender, educational level, and function. Only participants with at least three years' working experience were included in the analysis to ensure that they were able to participate adequately. Of the total of 234 participants, 218 had at least three years' working experience. Their mean age was 42 ( $SD=9$ ) and 76.1% were male. Their educational level ranged from primary or lower vocational education to PhD. Table 4.1 shows an overview of the companies that participated.

Table 4.1

*Overview of the Participating Companies in Terms of Main Product, Country, Number of Employees, and Number of Participants (with At Least Three Years Working Experience)*

Company number	Main product	Country	Number of employees	Number of participants
1	Paper	The Netherlands	185	16
2	Paper	The Netherlands	40	8
3	Seeds	The Netherlands	220	25
4	Chrysanthemum	The Netherlands	100	28
5	Union seeds	The Netherlands	62	28
6	Trade & distribution vegetables and fruits	The Netherlands	38	15
7	Orchids	The Netherlands	70	26
8	Substrates	Germany	370	21
9	Trade & distribution vegetables and fruits	The Netherlands	43	11
10	Champignons	The Netherlands	100	15
11	Trade & distribution vegetables and fruits	The Netherlands	450	13
12	Metal	The Netherlands	70	12

### 4.3.2 Procedure

The data were collected at the participating companies by the first author. At the time of the data collection, the participants first received information on the procedure. Secondly, they signed a declaration of consent, stating (1) that all data would be processed confidentially and (2) they gave permission for the use of their results for scientific purposes. They then worked on the questionnaire. After completing all the questions, the data were analysed and the first author returned to the company two weeks later in order to evaluate the data collection and discuss the results.

### 4.3.3 Measures

All the variables were measured using a questionnaire as the data collection tool. Most items were answered on a five-point ordinal scale. Items corresponding to a given concept (e.g., self-perceived creative self-efficacy) were combined in a summated rating scale which was used as an index in subsequent analyses. Noted advantages of summated rating scales include good reliability and validity (i.e., psychometric properties), ease in development, and ease to complete (Spector, 1992). Strictly speaking, parametric statistics may not be applied for such scales (Kampen & Swyngedouw, 2000), unless (as done in this study) the “pragmatic sanction” that “in numerous instances it leads to fruitful results” (Knapp, 1990, p. 123) is invoked.

#### *Opportunity identification competence*

To obtain insight into the outcome variable OIC, as valued in the context of existing firms, respondents were asked “How many new ideas from you (or your team) have been adopted by the management (resulting in a concrete project) either in whole or in part, during the last three years?” Only the responses of the participants who had at least three years’ working experience were included in the analysis. If they were ambiguous in their answers (e.g., indicating multiple numbers), the result was coded as a missing value. This way, wrong interpretation of answers was avoided.

#### *Learner factors*

Four learner-related factors were included in the questionnaire, namely self-perceived social networks, self-perceived creative self-efficacy, entrepreneurial intentions and entrepreneurial experience. To measure self-perceived social networks, a scale of three items was adopted from Wang and colleagues (2013). The questions focussed on social networks considered important in a business context, such as contact or discussion with customers, suppliers, distributors, social, and professional contacts. Self-perceived creative self-efficacy was measured according to a three-item scale of Tierney and Farmer

(2011) and included “I have confidence in my ability to solve problems creatively”. The participants’ entrepreneurial intentions were measured according to four items adopted from DeTienne and Chandler (2004), asking if participants would be involved in a new venture in the next 12 months, five years, 10 years, or sometime in their lifetime. Finally, to investigate prior experience in entrepreneurship, they were asked whether they had a company at the moment of testing, and whether they had had an entrepreneurial venture in the past. These two questions were combined, so that 0 = no prior experience in entrepreneurship, and 1 = running an entrepreneurial venture now or in the past.

#### *Work environment*

Three work environment factors were measured in the questionnaire, namely problem demand, job control and self-perceived industrial environment. To measure problem demand, the participants were asked “How often do you usually face relatively more complex problems that take at least 30 minutes to find a good solution?” The answers were formulated as *never; less than a month; less than once a week; at least once a week; and every day*. Job control was measured with the question “Considering the majority of your daily tasks at work, how precise are the instructions that you get from your supervisor regarding the process according to which they should be performed?” and could be answered with *The instructions I receive determine every step of how I should perform my tasks, with no freedom at all; I receive relatively precise instructions and have limited freedom; I receive clear instructions but I can still be flexible; I receive general instructions and mostly have to decide the details on my own; or I have to decide on my own how to perform my tasks*. The three questions on the self-perceived industrial environment were adopted from Wang and colleagues (2013) and asked the participants whether they perceived many opportunities for new product innovation, technological innovation, and whether there were opportunities for growth in the industry.

#### *Process: Entrepreneurial Employee Activity*

EEA was measured according to six items concerning how often the participants were involved in innovation-related activities which included task-related, internal as well as external work-related learning activities, such as acquiring new groups of customers, optimising the organisation of work, or producing ideas to improve work practices (de Jong & den Hartog, 2010).

#### 4.3.4 Analysis

The internal consistency of the scales was determined by principal components analysis. Measurement properties of all used summated rating scales showed sufficient psychometric properties, except for EEA. Here, three items showed relatively low factor loadings and were removed. All other loadings ranged between .69 and .92, which provided no evidence that items measured more than a single dimension. An indication of the scale's reliability was given by Cronbach's alfa, which ranged between .69 and .89. To gain detailed insight into the relationships between the learner factors, work environment, EEA, and OIC, the analyses consisted of two steps. First, the relationships between OIC and each block of antecedents were investigated separately in three multiple regression analyses (i.e., learner factors, work environment, and EEA), in order to reach a specific understanding of the influence of each block of antecedents on OIC. Second, in order to find the strongest predictors of OIC, a backward regression analysis was conducted in which all learner factors, work environment factors and EEA were entered. Possible dependencies of responses due to the fact that respondents clustered in organisations were checked by including organisation as a fixed factor in an ANCOVA of OIC and its antecedents. The results showed that organisation did not have a significant effect and it was therefore not needed to control for organisation in further analyses. Significance level for all tests were set at a relatively conservative alpha level of .01 in order to control for capitalisation on chance.

#### 4.4 Results

The participants had little entrepreneurial experience ( $M=2.21$ ) and entrepreneurial intentions ( $M=2.41$ ). Job control scored very high ( $M=4.17$ ), indicating that the participants experienced relatively high degrees of freedom in how they performed their tasks. Problem demand scored average ( $M=2.93$ ), suggesting that the participants faced complex problems (that take at least 30 minutes to find a good solution) less than once a week, but at least once a month. The participants' scores were comparable for the questions on the frequency with which they engaged in entrepreneurial work-related activities ( $M=3.20$ ). Furthermore, on average, they had had 3.83 business ideas adopted by the management over the previous three years. The standard deviation was relatively high ( $SD=4.20$ ), suggesting that some participants were more successful here than others. Moderately high correlations were found between self-perceived self-efficacy and self-perceived social networks ( $r=.40$ ), EEA and problem demand ( $r=.41$ ), and EEA and the number of ideas adopted by the management ( $r=.44$ ). Entrepreneurial experience did not correlate to any of the other variables. An overview of the descriptive statistics and correlations of the different variables from the model are given in Table 4.2.

Table 4.2  
Means, Standard Deviations, and Correlations for All the Variables

Measure	1	2	3	4	5	6	7	8	9	M	SD
1. Self-perceived social networks										3.84	.61
2. Self-perceived creative self-efficacy	.40**									3.79	.61
3. Entrepreneurial experience	-.06	.13								.21	.40
4. Entrepreneurial intentions	.26**	.27**	.13							2.41	.94
5. Problem demand	.21**	.18**	-.00	.27**						2.93	.98
6. Job control	.12	.09	.04	.10	.30**					4.17	.78
7. Self-perceived industrial environment	.30**	.17**	.03	.10	.04	-.00				3.82	.69
8. Entrepreneurial Employee Activity	.28**	.39**	.17	.18**	.41**	.28**	.19**			3.20	.82
9. Number of ideas adopted by the management	.22**	.28**	.10	.27**	.26**	.23**	.17	.44**		3.83	4.20



The three separate multiple regression analyses successively including the learner factors, work environment factors, and EEA suggested that EEA played the most important role in explaining OIC (i.e. the number of ideas adopted by the management). The F-values in the footnote denote the usual omnibus test for significance of the variables included in the analysis. The significant F-values suggest that all models significantly explained variance of the number of ideas adopted by the management as a whole. In the backward regression model, only two predictors remained: self-perceived creative self-efficacy and EEA. This model explained 24% variance of the number of adopted ideas by the management. The results of the multiple regression analysis per block and the backward regression analysis are shown in Table 4.3.

Table 4.3

*Three Separate Multiple Regression Analyses per Block Predicting the Number of Ideas Adopted by the Management, and a Backward Regression Analysis, Including all Blocks*

Predictor	Analysis per block (enter)			All blocks (backward) <sup>d</sup>		
	B	t	p	B	t	p
Block 1: Learner factors and OIC <sup>a</sup>						
Constant	-6.19	-2.58	.011	-6.68	-3.34	.001
Self-perceived social networks	.77	1.37	.174			
Self-perceived creative self-efficacy	1.57	2.48	.014	1.00	1.80	.074
Entrepreneurial experience	.66	.82	.416			
Entrepreneurial intentions	.39	1.01	.317			
Block 2: Work environment and OIC <sup>b</sup>						
Constant	-6.43	-2.59	.010			
Problem demand	.82	2.39	.018			
Job control	.95	2.14	.034			
Self-perceived industrial environment	1.02	2.39	.018			
Block 3: EEA and OIC <sup>c</sup>						
Constant	-3.89	-3.05	.003			
EEA	2.39	6.23	<.001	2.07	5.12	<.001

Note. <sup>a</sup>R<sup>2</sup>=.13, N = 144, F=4.99, df =4, 139, p<.01. <sup>b</sup>R<sup>2</sup>=.12 N=158, F=7.06, df=3, 154 p<.01. <sup>c</sup>R<sup>2</sup>=.20 N=160, F=38.75, df=1, 158, p<.01. <sup>d</sup>R<sup>2</sup>=.24, N=143, F=22.39, df=2, 140, p <.01.

## 4.5 Discussion

Because of the increasing interest in EE and entrepreneurial learning in general, and the shortage of studies on entrepreneurial learning of employees in existing businesses (Council of the European Union, 2011), this study focussed on the factors that influence entrepreneurial learning in an SME context. More specifically, the influence of learner factors, work environment factors, and EEA on individual OIC was investigated. The number of ideas of a participant adopted by the management in the last three years was used as a business-specific measure of his or her OIC. Employees from all levels of the organisations were included to obtain insight into entrepreneurship in companies in its broadest sense.

A first result of this study was that in the multiple regression analysis, in terms of learner factors, the largest contribution came from self-perceived creative self-efficacy. This is similar to earlier work that had been carried out in the field of independent entrepreneurship. For instance, meta-analysis showed that entrepreneurial self-efficacy was one of the strongest individual characteristics that explained entrepreneurial success in terms of growth and financial performance (Rauch & Frese, 2007a). Stimulating and developing entrepreneurial self-efficacy has become of major interest in EE programmes, starting already in initial education. Intervention studies suggest positive effects of organised learning activities on entrepreneurial self-efficacy (Fayolle, Gailly, & Lassas-Clerc, 2006), although experiments are scarce and need further validation (Martin et al., 2013; Rideout & Gray, 2013). In sum, the results of this study suggest that specific forms of entrepreneurial self-efficacy are important, not only for independent entrepreneurship, but also in the early stages of the entrepreneurial process in existing companies.

A second result was that work environment factors (job control, problem demand, and the perceived industrial environment) had a positive association with OIC. These effects disappeared in the backward regression analysis including learner factors and EEA. This is in accordance with the study by Holman and colleagues (2012) who found an indirect relation between job control, problem demand, and idea generation. The results provide mild evidence that work environment factors such as work design, organisation of work, and decision power not only yield more effective learning systems (Brandi & Ionnane, 2015), but may also indirectly foster the (necessary) flow of new business ideas from employees to the management.

A third important finding was that in the backward regression analysis, EEA had the largest impact on OIC. This confirms the results of the GEM, in which Bosma and colleagues (2013) found that employees involved in EEA were more likely to identify

business opportunities of good quality. Furthermore, it underlines the complex and dynamic nature of entrepreneurial learning, as the results show that learning and work are difficult to separate in an entrepreneurial context (Eraut, 2004; Wang & Chugh, 2014). Learning by doing is not only crucial for independent entrepreneurs, but also for employees who work for existing firms.

#### 4.5.1 Limitations and the future research agenda

In this study, the number of ideas adopted by the management was used as a performance indicator for OIC in the context of existing businesses. The results suggest that mainly EEA explains how many ideas of an employee are adopted by the management. Future research should map out how and to what extent EEA serves as a moderator or mediator between the other independent variables (i.e., learner factors and work environment) and OIC, for which a larger sample is needed. Such research could include additional work environment factors where previous research showed that it played a significant role in corporate entrepreneurship, for instance innovation culture (De Castro, Delgado-Verde, Navas-López, & Cruz-González, 2013). It is recommended to ask about the type of ideas adopted by the management. By scoring the ideas in terms of their innovativeness, it could be investigated more specifically whether and how work environment factors relate to OIC. For example, DeTienne and Chandler (2004) scored generated business ideas on innovativeness based on a 6-point Likert scale.

In this study, employees fulfilling all kind of functions were invited to participate. The data did not allow to make a distinction in entrepreneurial learning over functions. For future research, it is therefore recommended to collect data among a larger sample in order to compare employees in different functions. Some studies already focussed on a single group of employees (Wang et al., 2013, who focussed on research and development professionals). A comparison between several functions in one dataset would be interesting to investigate more specifically how entrepreneurial learning in businesses emerged and who was involved in it.

Entrepreneurial learning is very often a social or group activity (Dutta & Crossan, 2005). Therefore, it would be interesting to investigate the collaborative entrepreneurial learning of groups of employees. Next to the individual competence to identify opportunities, group competence to evaluate and exploit opportunities into a concrete plan for a new product, service, or process, could be tested.

## 4.6 Conclusion and policy implications

In sum, the results suggest that self-perceived creative self-efficacy, work environment factors and being actively engaged in entrepreneurial activities foster employees' success in having business ideas adopted by the management of the organisation. Although entrepreneurial learning is often informal in SMEs, and, as such, a by-product of work, the results also point to important areas to further strengthen entrepreneurial learning.

Firstly, the results emphasise the importance of soft skills, and more specifically belief in one's ability to execute entrepreneurial tasks, such as generating business ideas. As Brandi and Ionnane (2015) conclude, soft-skills are highly valued by employers and employees. Nevertheless, investment should mainly come from the individual employee, as in most SMEs there is a limited budget for developing such skills through training programmes. Companies invest primarily in harder skills that directly contribute to new business development and financial performance. As such, soft-skill development, like creative self-efficacy, depends on more informal learning mechanisms, such as mastery and vicarious learning. For early career professionals, this highlights the importance of fostering entrepreneurial self-efficacy in tertiary education. For more senior colleagues, this could be stimulated as a by-product in business-related programmes. Small companies could invest in combinations of business-related training programmes which simultaneously stimulate the development of softer entrepreneurial skills such as divergent thinking to enhance entrepreneurial self-efficacy.

Secondly, based on our results, we suggest that job control, problem demand, and the perceived opportunities in the environment indirectly contribute to entrepreneurial learning. Policy makers could play a role in designing jobs in which job complexity and autonomy are fostered at the shop floor level, and could facilitate collaboration between companies. As our results point towards a more complex interplay between the work environment and OIC, more research in this area is desirable.

The most important predictor of OIC was involvement in entrepreneurial activities, which confirms the importance of learning by doing. Learning by doing could be stimulated by involving employees in entrepreneurial work-related activities, investing in learning programmes with a focus on the shop floor level, and creating cooperation across boundaries within the organisation.

However, not all entrepreneurial learning is simply a matter of learning by doing. It would be a mistake to believe that entrepreneurial learning in the workplace often approaches its potential. As already indicated, individual (e.g., belief in one's skill) and

work environment factors (e.g., room to manoeuvre) need to be in place to afford these type of entrepreneurial, work-related activities. Moreover, evidence from the literature suggests that small-firm owner-managers value and exploit the learning potential of the work environment very differently (Lans et al., 2008). Hence, as owner-managers of SMEs have so much decision power, they must be educated and supported for this role. Nonetheless - as experienced in the data collection process among the various enterprises - the competence of managers in the field of entrepreneurial learning does not seem to be a priority in management development programmes. As the small-firm owner-managers play a crucial role in recognising, affording and reflecting on this type of behaviour, policy programmes should target this group and make the recognising, fostering and capitalising of entrepreneurial learning an integral part of management development programmes. In sum, close collaboration between policy makers, employers and entrepreneurial learning professionals is called for in efforts to effectively combine and realise entrepreneurial learning, human capital, EEA, and eventually value-creation in existing firms.

#### **4.7 From explaining individual OIC to exploring team OI in existing businesses**

In this chapter, antecedents of individual OIC have been investigated in SMEs. The entrepreneurial learning perspective helped gaining insights into the capability (i.e., OIC) employees need to act entrepreneurial, and what personal and organisational antecedents influence that capability. In the next chapter, the team level is included alongside the individual level. Here, individual and team OI are investigated from a cognitive perspective. That is, a perspective that provides insight into the patterns that can be recognised in how individuals and teams identify opportunities, by investigating the cognitive frameworks they develop based on experience in OI. In the next chapter, team OI is explored, as the study focuses on exploring individual and team cognitive OI frameworks, and not on understanding its antecedents.



## CHAPTER 5

# Opportunity identification by individual employees and teams in an SME context<sup>7</sup>

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<sup>7</sup> This chapter is based on:

Baggen, Y., Biemans, H. J. A., Kampen, J. K., Lans, T., & Mulder, M. *Opportunity identification by individual employees and teams in an SME context*. Manuscript submitted for publication.

### **Abstract**

Employees that are able to identify opportunities significantly contribute to realising all kinds of profitable business outcomes. As such, opportunity identification (OI) is of interest of employers as a key driver of competitiveness. In existing firms, OI can be an individual as well as a team effort. However, it remains unclear how OI differs between individuals and teams in the process of (corporate) entrepreneurship. In this study, individual and team OI were investigated from a cognitive perspective among 225 participants, representing 51 teams from 12 existing firms. More specifically, individuals develop cognitive frameworks based on experience, guiding performance when working on a certain task or problem. The cognitive OI frameworks of individual employees and teams were investigated and compared. Expert frameworks of independent entrepreneurs derived from the existing literature, were used as a starting point for interpreting the differences between individual and team OI. Expert frameworks can be considered to be of good quality, because they are refined, questioned, and sharpened over years of experience. The results suggest that the cognitive OI frameworks of teams correspond more closely with the expert OI frameworks, than the cognitive OI frameworks of individual employees. This suggests that OI by teams is preferred over OI by individuals and that teamwork and workforce commitment can be of significant value in early stages of entrepreneurship.



## 5.1 Introduction

Over the years, corporate entrepreneurship (also referred to as intrapreneurship) has received more and more attention as an important mean to realise competitive advantage (Ireland, Covin, & Kuratko, 2009; Nason, McKelvie, & Lumpkin, 2015). Corporate entrepreneurship contributes to, for instance, the realisation of innovation, strategic renewal, new business generation and business model transformation (Bosma et al., 2013; Corbett, Covin, O'Connor, & Tucci, 2013). Sharma and Chrisman (2007) refer to corporate entrepreneurship as “the process whereby an individual or a group of individuals, in association with an existing organization, create a new organization or instigate renewal or innovation within that organization” (p. 92). The (corporate) entrepreneurial process starts with the identification of potential business opportunities. Employees that are able to identify opportunities significantly contribute to personal, professional, and business development (Ireland, Hitt, Camp, & Sexton, 2001). This has been confirmed by Corbett and colleagues (2013) who argue that “the human element within the process of [corporate entrepreneurship] is what ultimately sustains or recaptures competitive advantages for the firm” (p. 817). The 2011 results of the Global Entrepreneurship Monitor, published by Bosma and colleagues in 2013, empirically support this claim by showing that employees actively involved in Entrepreneurial Employee Activity are more likely to identify potential business opportunities. As such, employers are highly interested in the capability of their employees to identify opportunities (Hornsby, Kuratko, Holt, & Wales, 2013).

Opportunity identification (OI) in firms is in most cases not solely an individual endeavour. It are often entrepreneurial teams that are involved in the search for new business opportunities (Shepherd & Krueger, 2002). Accordingly, Anderson and West (1998) consider that teams are a crucial component in the understanding of corporate entrepreneurship. Comparable claims about the importance of teams for all sorts of (organisational) outcomes can be found in independent entrepreneurship (e.g., Chowdhury, 2005), innovation (e.g., Hülshager, Anderson, & Salgado, 2009) and collaborative learning studies (e.g., Decuyper, Dochy, & van den Bossche, 2010). However, with regard to the early stages of the (corporate) entrepreneurship process it remains unclear in what way OI differs between individuals and teams.

An important perspective in the entrepreneurship literature that helps in further understanding such differences in OI is the cognitive perspective (Corbett & Hmieleski, 2007). Entrepreneurial cognitions have been studied in different contexts and both from an empirical and a conceptual point of view on the individual (e.g., Baron & Ensley, 2006; Krueger, 2000; Mitchell et al., 2002) and team or group level (e.g., de Mol,

Khapova, & Elfring, 2015). Especially studies comparing expert and novice entrepreneurs have significantly contributed to acquiring insights into differences in OI frameworks (Dew, Read, Sarasvathy, & Wiltbank, 2009). For instance, Baron and Ensley (2006) examined OI frameworks of experienced and novice independent entrepreneurs.

Nonetheless, research on cognitions for OI in existing firms is rather scarce (Hornsby et al., 2013; Ireland et al., 2009), especially across levels such as the individual and team level (Grégoire, Corbett, & McMullen, 2011; Shepherd & Krueger, 2002). In order to gain more insight into how OI differs between individuals and teams, clarity is needed whether or not a team's cognitive framework is more effective for identifying opportunities than an individual's cognitive OI framework (Shepherd & Krueger, 2002). Therefore, the aim of this study is to contribute to the ongoing genre of literature on entrepreneurial cognitions by studying the differences in cognitive OI frameworks between individuals and teams in small and medium-sized enterprises (SMEs; Dew et al., 2009). In order to gain more specific insight into how individual and team cognitive frameworks for OI differ, individual and team frameworks were compared with one another. Next, the frameworks were compared with those of an experienced entrepreneur from the study of Baron and Ensley (2006), to explore to what degree individual employees and teams identify opportunities in a similar way as experienced, independent entrepreneurs would do. More specifically, the main research questions of the current study are: (1) *To what degree do individual employees and teams have different cognitive OI frameworks for identifying business opportunities?* and (2) *To what extent do the cognitive OI frameworks of individual employees and teams correspond with the cognitive OI framework of an experienced, independent entrepreneur?*

In the next sections, OI is further elaborated upon. Subsequently, the cognitive perspective is explained, followed by a discussion of team cognition. Thereafter, the methods and results are presented, and finally the conclusions and future research suggestions are being discussed.

## 5.2 Opportunity identification

What entrepreneurial opportunities are and how they come into being, is a topic of lively discussion in the literature (e.g., Ardichvili, Cardozo, & Ray, 2003; DeTienne & Chandler, 2004; Renko, Shrader, & Simon, 2012). Recently, scholars argue that different views on opportunities can be useful in explaining the entrepreneurial process, and, as such, that opportunities can be created as well as found (Baggen et al., 2015; Venkataraman, Sarasvathy, Dew, & Forster, 2012). Accordingly, Dew and colleagues (2009) argue that "opportunities may be of several different kinds – some obvious and

easily recognized, others more subtle and not so easily discovered, and yet others nonexistent until people set out to make them from unexpected ingredients” (p. 25). Similarly, Baron and Ensley (2006) argue that for OI first of all changes in resources (e.g., markets, knowledge) are needed so that new ideas can come into existence and subsequently, to actually examine the potential of the idea, it has to emerge in active, cognitive processes in the mind of individuals.

Shane and Venkataraman (2000) conceptualised that the processes underlying entrepreneurial opportunities can be described as identification, evaluation, and exploitation. Although the different stages are intertwined, each stage has its own characteristics (Wood & McKelvie, 2015). Accordingly, the cognitive processes involved in each stage are different (Grégoire & Shepherd, 2012). The entrepreneurial process starts with OI in which an opportunity comes into existence. An individual enacts upon an idea and considers whether it could be an opportunity for someone or some firm with the right abilities, resources, and means to further exploit it (Grégoire & Shepherd, 2012). In other words, the individual determines whether it could be an opportunity for a hypothetical other person (Wood & McKelvie, 2015). Subsequently, in opportunity evaluation, the central question is whether the opportunity could be interesting for him or herself or the company he or she works for to further exploit it (Grégoire, Barr, & Shepherd, 2010; Grégoire & Shepherd, 2012). An individual evaluates whether he or she feels a personal desire to exploit the opportunity, and whether it is feasible to do so. In short, opportunity evaluation “makes it personal” (Wood & McKelvie, 2015, p. 228). Taken together, the focus in the current study is on the early stages of entrepreneurship, namely OI, and defined in line with Baron and Ensley (2006) who argue that (among other things) cognitive processes are needed for opportunities to emerge.

### 5.3 Cognition and entrepreneurship

Recently, the amount of research on individual cognition in entrepreneurship has grown rapidly, introducing different constructs from the cognitive field to entrepreneurship. An increasing number of scholars aims to get a better understanding of entrepreneurial cognition by comparing the cognitions of novice and experienced entrepreneurs (e.g., Baron & Ensley, 2006; Dew et al., 2009; Mitchell, Smith, Seawright, & Morse, 2000). These scholars share a common research tradition, but over time different literature genres with different terminologies (e.g., use of schemas, scripts, or cognitive frameworks), interpretations, and methodologies have developed (Dew et al., 2009).

Corbett and Hmieleski (2007) explain corporate entrepreneurs' cognition from the perspective of their cognitive expert schema. Expert schemas illustrate how successful entrepreneurs use and transform information that other, novice entrepreneurs, miss (Mitchell et al., 2000). A schema is "a pedagogical mental structure, one that enables learning by facilitating memory retrieval and the learner's capacity to make inferences on the basis of current knowledge" (Glaser, 1984, p. 101). In schemas, knowledge in a certain domain is organised, including all its features and the relationships between those features. In short, schemas guide individuals' performance when working on a certain task or problem (Driscoll, 1999). Expert schemas are connected to a specific domain and highly developed and ordered, as they have been refined, questioned, and sharpened over years of experience into expert schemas (Glaser, 1984; Mitchell et al., 2000). In addition, Driscoll (1999) argues that experts' approach to problem solving involves the recognition of certain patterns that they have seen previously, in similar problem situations. By matching the patterns already developed in more complete schemas to the current problem situation, they are able to solve the problem with the help of earlier developed schemas.

Baron and Ensley (2006) investigated specifically the differences in OI frameworks between independent novice and experienced entrepreneurs. In accordance with theory on cognitive expert schemas, they argue that experts develop cognitive frameworks that help them recognising meaningful patterns and links between relevant events and information (Baron, 2004; Baron & Ensley, 2006). To explore the frameworks of novice (first-time) and experienced entrepreneurs, they asked them "[d]escribe the idea on which your venture was based" and "[w]hy did you feel this was a good idea – one worth pursuing?" (Baron & Ensley, 2006, p. 1334). Based on the results, they developed two frameworks, one for an experienced entrepreneur and one for a novice entrepreneur each including five different factors and conditions experienced and novice entrepreneurs tend to focus on when determining business ideas' potential success.

Although Baron and Ensley (2006) explicitly use the terms factors and conditions, the components of their frameworks seem to have the nature of arguments. The questions underlying these components are rather evaluative questions, directed towards the formulation of arguments indicating how the entrepreneurs determined the potential success of business ideas. Arguments are part of cognitive frameworks as they can guide action and decision-making processes, when new information is being evaluated along the cognitive framework an individual has developed (Baron & Ensley, 2006; Driscoll, 1999). In the case of OI, if a new business idea (i.e., in the form of

information from a new event, situation, or other change in the environment) fits closely to the existing framework, an individual might decide to further explore that idea as it has potential to be a real opportunity. The frameworks (see Table 5.1 for a full overview of the specific arguments) show that novice entrepreneurs tend to focus more on “newness” or “uniqueness” of business ideas in OI, while experienced entrepreneurs focus more on the actual process of starting and running a new business.

Although empirical research has provided insight into the cognitive expert frameworks of independent entrepreneurs, there is still a lack of clarity on intrapreneurial cognitions (Corbett & Hmieleski, 2007). As Corbett and Hmieleski (2007) argue, the cognitions of corporate entrepreneurs could differ from those of independent entrepreneurs, because their context is different. Corporate entrepreneurs work for an organisation with its own rules, regulations, culture, strategy, and structure. More specifically, large organisations generally have a more bureaucratic structure, while small ventures often have an organic structure (Garrett & van Holland, 2015). Similarly, corporate entrepreneurs are oriented towards existing markets, while independent entrepreneurs tend to focus on new markets. As such, employees willing to act entrepreneurial might face different challenges and might need to apply different strategies in order to realise innovations.

### 5.3.1 Team cognition in entrepreneurship

The importance of investigating team cognition in (corporate) entrepreneurship is repeatedly underlined in the literature. For instance, Klotz, Hmieleski, Bradley, and Busenitz (2013) reviewed the literature on new venture teams and state that new ventures are mostly founded by teams, instead of by solo entrepreneurs. Similarly, Shepherd and Krueger (2002) argue that in corporate entrepreneurship “teams are central to our understanding of what makes an organization entrepreneurial” (p. 167). Grégoire and colleagues (2011) suggest that the cognitive perspective is not limited to the individual level of analysis – mental representations can also be a result of team or organisational efforts. As West (2007) argues, individuals and teams face similar processes and decisions in the entrepreneurial process. Both individuals and teams need information in order to make decisions, learn, develop a mental schema, and, eventually, refine it into an expert schema. Both individuals and teams use this schema to define next steps, and determine whether or not an opportunity is worth pursuing. Despite these similarities, it is expected that collective cognition is significantly different from the simple sum of individual cognitions, because the process underlying the eventual collective map is different. Team members get the opportunity to discuss

and share information with each other (Shepherd & Krueger, 2002). As a result, team cognition might be more than the compilation of individual cognitions. However, how the cognitive frameworks of individuals and teams differ, remains unclear. Therefore, in the current study it is investigated whether or not and if so, how the cognitive OI frameworks of individual employees and teams differ. Additionally, as a way to interpret the cognitive OI frameworks of the employees, it is investigated to what extent these frameworks correspond with the OI framework of experienced, independent entrepreneurs.

## 5.4 Methods

For the current study, a performance assessment was applied to measure OI. Below, the participants and procedure are explained, followed by the measures and analyses.

### 5.4.1 Participants

Twelve SMEs (11 Dutch, one German) from the manufacturing industry voluntarily participated in the current study. The focus on the SME context was chosen because 9 out of 10 companies in the European Union (EU) is an SME (European Commission, 2015). Moreover, SMEs are considered the driving force behind economic growth and stimulate entrepreneurial thinking in the EU. The companies were active in the paper, agricultural, food, and metal industry and all introduced at least one new product, service or process on the market in the last three years (see Chapter 4 and Table 4.1 for a complete description and an overview of the participating companies). In sum, 225 participants, representing 51 teams, participated in a performance assessment. Because entrepreneurial challenges in existing SMEs involve a broad range of activities, for which employees fulfilling all kinds of roles and jobs are needed (Toner, 2011), a mix of employees was invited to participate in the study. As such, the educational background of the participants differed strongly, and so did the jobs they fulfilled at the moment of testing: some worked on the “shop floor” (e.g., in the greenhouse or with machines), others worked for departments such as human resources, marketing, sales, and still others were member of the top management teams of the companies. The majority of the participants was male (73.8%) and the mean age of the participants was 41 ( $SD=10$  years), ranging from 21 to 60 years of age.

### 5.4.2 Procedure

Each company was personally invited to participate in the research project. The first author visited all companies to explain the procedure and expectations. In close

collaboration with the company, it was decided who was invited to participate in the performance assessment. At all companies a representative group of employees for the organisation was invited for participation. All data were collected by the first author. A maximum of 15 individuals participated in the testing at the same time. At the moment of data collection, the procedure was explained and the participants signed a declaration of consent stating (1) that their results would be processed confidentially and (2) that they gave permission for the use of their results for scientific purposes. Next, the participants worked on an individual task for five minutes. Subsequently, they were randomly assigned to teams, and worked on a group task for 10 minutes. The size of the teams was four persons (30 teams) or five persons (21 teams). Finally, the participants completed a questionnaire. Together, the testing procedure (i.e., introduction, individual and group tasks, and questionnaire) took about three hours, as it was part of a larger research project. About two weeks later, the first author returned to the company to evaluate the data collection and discuss the results with the management and/or human resources. During this meeting, only mean scores were discussed, individual (confidential) results were not shared with any employees from the companies.

### 5.4.3 Measures

A performance assessment was used to investigate OI. The individuals got exactly the same assignment individually and as a team. Data on background variables, such as gender, age, job, and educational background, were collected with a questionnaire which was distributed after the participants completed the tasks.

An accepted way to measure expert scripts, is the use of a “script-scenario construction model” (Mitchell et al., 2000, p. 982). When experts face a task within their field of expertise and are asked to respond to a task by choosing the best out of different given options, they are expected to select those options that align with their script. The selection of the expert-specific options is an indicator for the existence of an expert script. Accordingly, the frameworks of Baron and Ensley (2006) offer insight into the typical script of a novice and the typical script of an experienced entrepreneur, as they include different arguments that novice and experienced entrepreneurs use when identifying business opportunities. Hence, the task was designed based on the arguments derived from these frameworks. First, the individual-level task was designed and tested in a pilot among 115 master’s students at a Dutch university in the life sciences domain. Secondly, the task was tested on the individual and group level in an innovative SME among 29 employees. Based on the pilots among the students and

at the SME, some changes were processed in close collaboration with an expert in the field of entrepreneurship. In the next paragraph, the actual task as used during the data collection at the companies is elaborated. In the results section, only the results of the data collected at the 12 SMEs will be discussed.

The participants received a list with 10 arguments: five arguments were derived from the framework of the novice entrepreneur, and five arguments were derived from the framework of the experienced entrepreneur. The five arguments from the framework of the experienced entrepreneur were: (1) "ability to generate recurring revenues"; (2) "solving a customer's problem"; (3) "manageable risk"; (4) "existence of an ecosystem (other companies, persons) with whom to develop the idea"; (5) "cost of customer acquisition". The five arguments from the framework of the novice entrepreneur were: (1) "superiority of product/service"; (2) "how novel the idea is"; (3) "intuition or gut feeling" (4) "potential to change the industry"; (5) "extent to which idea is based on new technology". The participants were asked to select the five arguments they thought would be most important when determining the potential success of business ideas.

#### 5.4.4 Data analysis

In order to test whether or not the individuals selected arguments differently than the teams, Pearson's Chi-square for independence was calculated. Secondly, by-variable cluster analyses of individual and team arguments were used to gain more insight into what types of arguments the individuals and teams tended to select, and whether there were discernible differences and similarities between the choices of individuals and groups. Ward's method was applied in order to generate clear and distinct clusters (see Punj & Sterwart, 1983). Dendrograms were applied to visualize clusters in the data. The cluster analysis of the team selection of arguments was done in an aggregated data file including only the group scores. Thirdly, the scores of the individuals and teams were compared to the framework of the experienced entrepreneur of Baron and Ensley (2006). More specifically, the amount of arguments derived from the framework of the experienced entrepreneur were counted for the individuals and teams, resulting in a minimum score of 0 and a maximum score of 5 arguments. In order to make a fair comparison, an aggregated data file was created including (1) the average score of the individuals per group, and (2) the group score. Paired sample t-test was used to calculate whether or not the individual's and team's scores differed significantly.



## 5.5 Results

Table 5.1 presents descriptive statistics for the individual and team selection of arguments. Chi-square depicts whether or not differences in selection were significant for each argument.

Table 5.1

*Mean, Standard Error, Chi-square, and P-value for the Probability That Arguments were Selected (Most Selected Argument by the Teams is on Top; 1 = Selected, 0 = Not Selected)*

Argument	Individual		Team		$\chi^2$	<i>p</i>
	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>		
Ability to generate recurring revenues*	.70	.03	.92	.02	11.11	.001
Solving a customer's problem*	.65	.03	.77	.03	24.82	<.001
Manageable risk*	.48	.03	.64	.03	12.56	<.001
Superiority of product/service	.54	.03	.64	.03	11.83	.001
Existence of an ecosystem (other companies, persons) with whom to develop the idea*	.57	.03	.64	.03	20.21	<.001
Potential to change the industry	.44	.03	.40	.03	12.29	<.001
Intuition or gut feeling	.39	.03	.33	.03	15.19	<.001
How novel the idea is	.42	.03	.26	.03	15.47	<.001
Extent to which idea is based on new technology	.45	.03	.21	.03	19.88	<.001
Cost of customer acquisition*	.28	.03	.19	.03	6.56	.010

*Note.* \*=argument derived from the framework of an experienced entrepreneur (Baron & Ensley, 2006).

The results of Table 5.1 show that individuals and teams both valued the arguments “ability to generate recurring revenues” and “solving a customer’s problem” as important arguments. Moreover, almost all teams selected the argument “ability to generate recurring revenues” ( $M=.92$ ). “Cost of customer acquisition” was considered the least important argument. Furthermore, the five most frequently selected arguments by the individuals, were even more often selected by the teams. Reversely, the five less frequently selected arguments by the individuals, were all less often selected by the teams. Chi-square results show that these differences in the selection of arguments were significant. However, some differences in individual and team selection were rather small, such as the case for “potential to change the industry”, where only a difference of .04 was found between the individual and team selection. Although this is a significant difference, its meaning has to be interpreted with care. Standard errors were in the range between .2 and .3.

Next, in order to investigate more thoroughly how the individual and team cognitive frameworks differed, and to what extent the OI frameworks of the individual employees and teams were similar to the OI frameworks of Baron and Ensley (2006), cluster analyses were conducted. Figure 5.1 shows the dendrogram of the individual employees (please note that, for the readability of the figure, the formulation of the arguments was shortened).

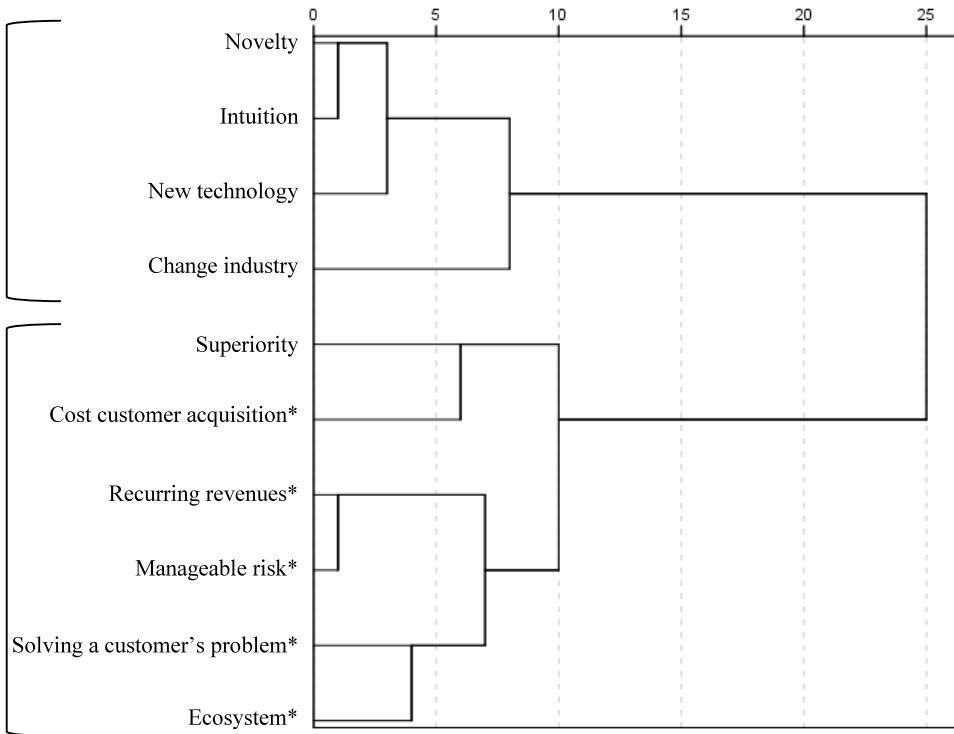


Figure 5.1. Dendrogram of selection of arguments by individuals, showing what clusters of arguments the participants tended to select. The arguments with \* are derived from the framework of an experienced entrepreneur (Baron & Ensley, 2006).

Reading the dendrogram from left to right, the earlier the variables are connected, the more similar the (not) selecting of these arguments was by individual participants (the employees). The dendrogram of the selection of arguments by the employees shows two clusters, one including the arguments “novelty”, “intuition”, “new technology”, and “change industry”, and one including “superiority”, “cost of customer acquisition”, “recurring revenues”, “manageable risk”, “solving a customer's problem”,

and “ecosystem”. As the results of Table 5.1 suggest, the arguments from the second cluster were more often selected than the arguments from the first cluster.

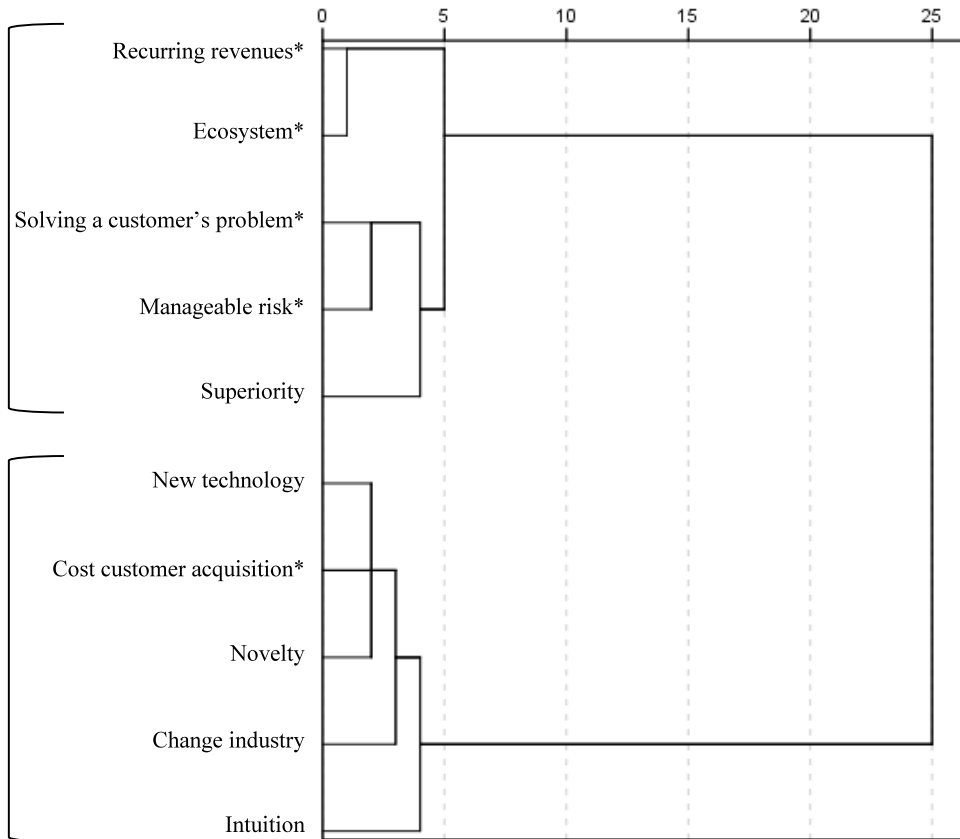


Figure 5.2. Dendrogram of selection of arguments by teams, showing what clusters of arguments the participants tended to select. The arguments with \* are derived from the framework of an experienced entrepreneur (Baron & Ensley, 2006).

Also two clusters were recognised in the dendrogram of the teams. The first includes “recurring revenues”, “ecosystem”, “solving a customer’s problem”, “manageable risk”, and “superiority”. The second includes “new technology”, “cost of customer acquisition”, “novelty”, “change industry”, and “intuition”. As the results of Table 5.1 suggest, the arguments from the first cluster were more often selected than the arguments from the second cluster. Compared to the dendrogram of the individual employees, here the clusters centre more to the left, indicating that the teams were more similar in their selection of arguments. In other words, the within cluster

heterogeneity is smaller in the group selection than in the individual selection. Furthermore, the teams tended to select “cost of customer acquisition” in combination with the other cluster of arguments, namely the one including “change industry”, “new technology”, “intuition”, and “novelty”.

Finally, in order to explore whether the cognitive frameworks of the individuals or the teams were more similar to the framework of the experienced entrepreneur as proposed by Baron and Ensley (2006), a paired sample t-test was performed. The number of arguments the individuals and teams selected similar to the OI framework of the experienced entrepreneur was simply counted, resulting in a minimum score of zero and a maximum score of five. Next, an aggregated data file was created, including (1) the mean score of the individual selection of arguments similar to the framework of the experienced entrepreneur per team (e.g., if a team consists out of four persons, two of them selected three out of five expert arguments, and two of them selected four out of five expert arguments, this resulted in a mean score of 3.5) and (2) the number of arguments selected by the team similar to the framework of the experienced entrepreneur. Over these scores the paired sample t-test was performed. The results show that the teams ( $M=3.18$ ,  $SD=.87$ ) scored higher than the individuals ( $M=2.69$ ,  $SD=.53$ ) on similarity with the OI expert framework, and that this difference was significant ( $t(50)=-5.35$ ,  $p<.001$ ), indicating that the teams scored significantly more similar to the framework of the experienced, independent entrepreneur compared to the individual employees. Because it appeared that not all conditions of the paired sample t-test were met (i.e., the data were not normally distributed), it was decided to additionally perform a non-parametric test, namely the Wilcoxon signed-rank test. This test confirms that the teams ( $Mdn=3.00$ ) scored significantly higher on similarity with the expert framework than the individual employees ( $Mdn=2.75$ ;  $z=-4.46$ ,  $p<.001$ ).

## 5.6 Discussion

OI is at the core of the entrepreneurship literature (Dutta & Crossan, 2005; Shane & Venkataraman, 2000) and of increasing interest of employers as a way to realise innovation and competitive advantage (Ireland et al., 2009). To identify opportunities, employers heavily depend on their human assets (Corbett et al., 2013). More specifically, individual employees and teams both play a role in OI, but it remains unclear whether or not individuals and teams use different cognitive OI frameworks and if so, how these frameworks differ (Corbett & Hmieleski, 2007). The aim of the current study was to contribute to the literature by (1) investigating how cognitive OI frameworks of individual employees and teams differ, and (2) to what extent the

frameworks of the individual employees and teams correspond with the cognitive OI framework of experienced, independent entrepreneurs.

In order to address the first research question, Chi-square was applied to investigate to what extent individual employees and teams use different arguments to identify business opportunities. Although some differences were rather small, the Chi-square results show that the individuals and teams selected each argument less or more often compared to each other. This finding is in line with the conceptual notion of Shepherd and Krueger (2002) and West (2007) who argue that team cognition is different from individual cognition. Furthermore, the results indicate that arguments that were often selected by individuals, were even more often selected by teams. The reversed was also observed: arguments not so often selected by individuals, were even less often selected by teams. These results suggest that the team members did develop their own, shared mental model, different from the simple sum of individual cognitions. As Decuyper and colleagues (2010) argue “team members can complement, confront and integrate each other’s knowledge, competencies, opinions or creative thoughts” (p. 116). Although the results have to be interpreted carefully, because the process of constructing the shared cognitive framework was not investigated, the results suggest that team members constructively used the knowledge of the team members when working on the task.

In addition, to further elaborate on the differences between individual and team cognitive OI frameworks, cluster analyses were performed. In the light of the OI framework of the independent, experienced entrepreneur, some differences between the individual and team OI framework could be observed. The first cluster of the individuals included four out of five novice arguments, and the second included all arguments derived from the framework of the experienced entrepreneur (next to one novice argument). The first team cluster included four out of five experienced arguments, and the second four out of five novice arguments. More specifically, the dendrograms show that the argument “cost of customer acquisition” was clearly valued as a less important argument by the teams, whereas “superiority of the product or service” was generally selected in combination with the other four arguments from the framework of the experienced entrepreneur of Baron and Ensley (2006). A possible explanation for the fact that the teams did not consider “cost of customer acquisition” as an important argument in OI, is the different context and structures employees have to deal with as opposed to independent entrepreneurs (Corbett & Hmieleski, 2007; Garrett & van Holland, 2015). More specifically, employees working for an existing organisation act in a completely different environment than independent

entrepreneurs. In the case of the current study, the participants worked for Dutch SMEs in the manufacturing industry (except for one German enterprise). Generally, employees have access to business resources and a wide and relevant network to rely on, whereas independent entrepreneurs have to rely more on their improvisation skills and have to build their own network (Corbett & Hmieleski, 2007). Moreover, employees generally tend to apply a prevention strategy, protecting products and services against competitors, whereas independent entrepreneurs apply a promotion strategy, seeking for new products and services. “Cost of customer acquisition” might not be relevant in the context of the SMEs that participated in the current study because they possibly already have their customers to whom they can offer a new product or service. Instead, for them it might be more important to develop a superior product or service in comparison to competitors.

Overall, the clusters of the individual employees were less obvious than the clusters of the teams, meaning that the teams mutually agreed stronger upon the selection of certain arguments. Still, the individual and especially the team cognitive OI framework matched the frameworks developed by Baron and Ensley (2006) to a considerable degree; only the difference discussed above was observed between the frameworks of independent entrepreneurs and the participants from the current study. Apparently, the participants were able to identify meaningful patterns or stimuli in the list of 10 arguments (Mitchell et al., 2000), especially when working in teams. These results suggest that there is some common nature discernible between opportunities from the perspective of independent entrepreneurs and employees (Baron, 2004).

For the second research question it was investigated to what extent the frameworks of the individuals and teams correspond to the framework of an experienced, independent entrepreneur, by measuring whether the individual employees’ or teams’ cognitive OI framework matched the framework of the experienced, independent entrepreneur more closely. The results show that the teams scored significantly more similar to the framework of the experienced entrepreneur compared to the individual employees. Cognitive theory might help to explain this result, as it explains how people think, reason, and make decisions, and thereby contributes to understanding entrepreneurial behaviour, which is a result of underlying, cognitive processes. More specifically, team members interact, face conflicts and have to convince one another. It takes efforts for teams to reach a state of team synergy, they have to overcome all kinds of tensions in order to make joint decisions and realise action (West, 2007). Because of these complex processes and team member’s interactions, team cognition can be seen as an emergent state (De Mol et al.,

2015). Team members are in a continuous process of discussing, sharing, and storing information. In short, the cognitive OI framework of the teams was more obvious (as shown by the cluster analysis) and their cognitive OI framework was more similar to the cognitive OI framework of the independent, experienced entrepreneur. So, taken together, the results of this study suggest that the processes and complex interactions teams have to deal with positively influence eventual decision-making in OI.

Additionally, the findings from the current study align with studies in which the role of teams in new venture creation and existing organisations is being discussed. In independent entrepreneurship, research has shown that new ventures are commonly started by teams, rather than by solo entrepreneurs (Klotz et al., 2013; West, 2007). From an organisational learning perspective, Decuyper and colleagues (2010) argue that teams are important learning units in the organisation and play a crucial role in responding to today's dynamic business environment. The results from the current study confirm the importance of teams, by highlighting the importance of team performance in intrapreneurship, and more specifically the identification of business opportunities. Moreover, the results indicate that the cognitive OI framework of the mixed teams from the current study matched the cognitive OI framework of independent, experienced entrepreneurs quite well. Accordingly, Toner (2011) argues that entrepreneurship is a shared responsibility in which employees fulfilling a broad range of jobs and roles are needed. The results from this study seem to confirm this notion. Furthermore, the results strengthen the vision of Lans, Biemans, Verstegen, and Mulder (2008) that especially in SMEs regularly discussing ideas with the personnel and applying strategies with a long-term focus can contribute to its innovativeness. Teams can have a significant share in entrepreneurship, irrespective of their member's educational level, already in the early stages of entrepreneurship.

### **5.6.1 Limitations and the future research agenda**

For the current study, the frameworks of independent entrepreneurs as developed by Baron and Ensley (2006) were used as a starting point for exploring the cognitive frameworks of employees and teams from SMEs. The results from the current study suggest that the cognitive OI frameworks of employees (and especially those of teams) considerably match the cognitive OI framework of the independent entrepreneurs. However, in their conceptual work Corbett and Hmieleski (2007) argue that the frameworks of independent entrepreneurs and intrapreneurs could be different. The results of the current study did show that "cost of acquisition" is not an argument being valued in an SME context, and it would be interesting to further explore these

kinds of differences. Therefore, in future research, the cognitive framework of entrepreneurial employees could be investigated more specifically, without using another cognitive framework as a starting point, in a qualitative research design. In such research, not only the arguments that are important to entrepreneurial employees in OI could be investigated, but also the social and environmental factors that play a role in their decision-making processes.

Subsequently, the task could be applied and tested systematically over different contexts, such as independent entrepreneurs, new venture teams, and in existing businesses, in order to refine the task and investigate differences over contexts more specifically. Also further research within the SME context is desirable, because the current study was conducted at SMEs with affinity for innovation in the Netherlands and Germany. Therefore, the results might not be generalisable to other SMEs with different backgrounds. Keeping a focus on SMEs (but for instance different sectors within SMEs) is also valuable because SMEs play such a crucial role in economies. The factors that explain their success are still not mapped (Hulbert, Gilmore, & Carson, 2015).

The results of the current study suggest that the cognitive OI framework of teams differs significantly from individual employees, and that the cognitive OI framework of teams corresponds more closely to the cognitive OI framework of an independent entrepreneur. However, *why* the cognitive framework of the teams is more closely related to the one of experienced entrepreneurs, and *how* teams identify opportunities, was not investigated in the current study. In future research the underlying, cognitive processes and their antecedents could be investigated. For instance, Tierney and Farmer (2011) and Baggen, Lans, Biemans, Kampen, and Mulder (2016) stress the importance of creative self-efficacy in OI. Creative self-efficacy of group members might have an influence on team performance. Similarly, the involvement in entrepreneurial-related activities at the workplace can enhance OI (Baggen et al., 2016). Furthermore, team diversity (i.e., educational level, background, gender) can impact team performance (Foo, Sin, & Yion, 2006; Hmieleski & Ensley, 2007). For instance, Gruber, MacMillan, and Thompson (2012) found that teams including members from various educational levels had advantages in identifying business opportunities. Furthermore, their results show that entrepreneurial and management experience had a positive effect on OI, although technological and marketing experience constrained OI. Future research could validate and extent such research to further improve the understanding of teams in the early stages of entrepreneurship, namely OI.



To conclude, in the current study a closed task was used to measure the cognitive framework of the participants, in line with the script-scenario construction model as referred to by Mitchell and colleagues (2000). The instrument was useful in order to compare individual and teams results, and to compare the results of the participants with the framework of independent entrepreneurs. However, based on this task it was not possible to explore the ability of the participants to evaluate opportunities (Wood & McKelvie, 2015). As Wood and McKelvie (2015) argue, scholars have invested relatively less time in investigating opportunity evaluation, in comparison to OI. Yet, opportunity evaluation is of large importance in the opportunity process, as it is in this stage that individuals and teams decide whether or not they are willing and able to personally act upon an opportunity. The cognitions involved in opportunity evaluation in businesses could be explored in future research, for instance by adjusting the task from the current study towards an open-ended task in which participants have to formulate arguments themselves why they would personally invest in an opportunity or not.

## 5.7 Conclusion

Two main conclusions can be drawn from the current study. First of all, the results confirm the conceptual notion from the literature that team cognition is more than the simple sum of individual cognitions (Corbett & Hmieleski, 2007). The individual employees and teams produced different outcomes when working on the same task. Secondly, the cognitive OI framework of the teams was considerably clear and was more similar to the framework of an experienced, independent entrepreneur compared to the framework of the individual employees. Hereby, the results of the current study suggest that a team's cognitive OI framework is a more effective heuristic for identifying business opportunities than the cognitive OI framework of an individual (Shepherd & Krueger, 2002). As such, the importance of involving teams already in the earliest stages of the entrepreneurial process in an intrapreneurial environment is being stressed by the results from this study. Future research is needed to further refine the cognitive OI frameworks of employees and teams in and beyond the SME context, and to explore what antecedents contribute to OI on the individual and especially the team level.





## CHAPTER 6

### Summarizing conclusions and general discussion



## 6.1 Introduction

This thesis is about opportunity identification (OI) by employees. The capability of employees to identify opportunities, referred to as opportunity identification competence (OIC), was explained by investigating which personal and organisational antecedents influence OIC in individual employees. Team level OI was explored by investigating the cognitive frameworks teams use to identify opportunities, and by comparing those to the cognitive frameworks of individuals. Opportunity identification (OI) is part of the defining, initial stage of the entrepreneurial process, as entrepreneurship always starts with the identification of a potential opportunity (DeTienne & Chandler, 2004; Shane & Venkataraman, 2000; Suddaby, Bruton, & Si, 2015). Identifying and exploring opportunities can result in all kinds of profitable business outcomes that can help organisations maintain their competitive advantage (Ireland, Covin, & Kuratko, 2009). In the current dissertation, OI was mainly investigated in small and medium-sized enterprises (SMEs). All participating organisations shared an urgent need for entrepreneurship, and in all participating organisations the input from employees fulfilling all kinds of jobs and roles regarding entrepreneurship was appreciated.

As stated in Chapter 1, research on OI is still in its infancy (Suddaby et al., 2015; Vogel, 2016). The main goal of the current study was to contribute to understanding employee OI in relation to three overarching research issues. The first research issue relates to understanding the OI process. More specifically, what opportunities are and how they come into being is a topic of lively discussion in the literature. There are various perspectives on opportunities and their identification, such as the objective and subjective view. Furthermore, scholars have already provided helpful models of the process underlying opportunities (Wood & McKinley, 2010, for example), but we still do not have a complete understanding of the opportunity process and the role of individuals and teams in it.

The second research issue relates to defining OIC. Because of the substantial role people play in identifying opportunities (Corbett, Covin, O'Connor, & Tucci, 2013) the capability of individuals to identify opportunities was investigated in this thesis from a competence theory perspective. A competence can be approached as a capability people can develop, and a competence is always connected to a certain context (Biemans, Wesselink, Gulikers, Schaafsma, Verstegen, & Mulder, 2009; Kyndt & Baert, 2015). Consequently, to be able to explain individual OIC, insight is needed regarding the influence of antecedents (i.e., personal and organisational factors) on OIC.

However, it is still unclear which antecedents play a role in OIC in existing businesses (de Jong, 2013).

The third research issue is related to the measurement of OIC. Although there are several instruments for measuring OIC, there is no performance assessment that measures the actual thinking and behaviour involved in OIC.

In order to contribute to a better understanding of OI in relation to these three overarching research issues, OI was conceptually mapped and empirically investigated. The central research question is: *What characterises opportunity identification by employees on the individual and team level?*

Five research sub-questions were formulated, each contributing to answering the central research question and also to a better understanding of one or more of the overarching research issues:

1. What is OIC?
2. What is a suitable instrument for assessing OIC?
3. What are antecedents of individual OIC (as an outcome of entrepreneurial learning) in a small and medium-sized business context?
4. To what degree do individual employees and teams have different cognitive OI frameworks for identifying business opportunities?
5. To what extent do the cognitive OI frameworks of individual employees and teams correspond with the cognitive OI framework of an experienced, independent entrepreneur?

This final chapter begins with a summary of the main findings from the different studies and treatment of the research sub-questions. The following section includes a presentation of the main conclusions and the answering of the central research question based on the results of this research project. Next comes a discussion of the results in light of the three overarching research issues presented above, followed by a discussion of the limitations of the dissertation. Suggestions for future research are integrated into the discussion of the results, and presented in relation to the limitations of the dissertation. The chapter ends with elaboration on the meaning of the results for practice from the perspective of three levels: SMEs, higher education, and policy.

## 6.2 Summary of the findings

This PhD research was part of the LLLight'in'Europe research project, of which the core construct of interest was complex problem solving (CPS). The conceptual discussion in

Chapter 2 elaborating on the role of OIC and CPS skills in entrepreneurship helped to explore the conceptual boundaries of the two constructs and their relation to entrepreneurship. The research sub-question, “*What is OIC?*” can be answered based on the results of this chapter. First of all, opportunities can be approached as either objective or subjective in nature. Secondly, the work of Wood and McKinley (2010) assisted in gaining insight into the process underlying OI. In their conceptual model they include the influencing role of both environmental and relational factors on OI. Their model helped in gaining a better understanding of the complexity of the process fundamental to OI. Wood and McKinley (2010) described the opportunity production process as *opportunity objectification* and *opportunity enactment*. In the current study OI was considered part of opportunity objectification, and inputs from both the objective and subjective view were used in the studies. Accordingly, individual OIC was defined as: “The ability of individuals to identify ideas for new products, processes, practices or services in response to a particular pain, problem or new market need” (Baggen et al., 2015, p. 417). Thirdly, a discussion of existing instruments to measure OIC led to the conclusion that these instruments might not fully capture the actual thinking and behaviour of people, but rather measure perceptions (i.e., self-perceived OIC).

Similarly, Chapter 3 contained an investigation of the research sub-question “*What is a suitable instrument for assessing OIC?*”. A performance assessment, referred to as the opportunity identification competence assessment test (OICAT), was developed and tested among 115 Dutch master’s students and 142 Portuguese bachelor’s students (i.e., students with and without an affinity for entrepreneurship). Higher education was considered a suitable setting to develop and test the OICAT. The instrument was developed in such way that it would be applicable to a wide range of participants (students, independent entrepreneurs, employees, etc.). The OICAT consisted of two tasks: Task 1, business idea generation, and Task 2, business idea evaluation. The results of this empirical study showed that the OICAT can be used to track individual differences in OIC. Furthermore, there was no significant correlation between the two tasks, indicating that the OI process consists of different sub-stages requiring people with different competencies.

Next, Chapter 4 explored the research sub-question, “*What are antecedents of individual OIC (as an outcome of entrepreneurial learning) in a small and medium-sized business context?*”, approaching OIC from an entrepreneurial learning perspective, and using the 3-P model (i.e., presage, process, and product) of Tynjälä (2013) to explore antecedents of individuals’ OIC. In total, 234 employees from 12 companies participated in this study; survey data were collected and analysed. The number of

ideas adopted by the management was used as a business-specific measure of OIC. The results show that self-perceived creative self-efficacy and Entrepreneurial Employee Activity (EEA), in other words actual involvement in entrepreneurial activities at the shop floor, positively influenced individuals' OIC. Work environment factors (i.e., job control, problem demand and self-perceived industrial environment) were only indirectly related to individuals' OIC.

Chapter 5 contains discussion of two research sub-questions: "*To what degree do individual employees and teams have different cognitive OI frameworks for identifying business opportunities?*" and "*To what extent do the cognitive OI frameworks of individual employees and teams correspond with the cognitive OI framework of an experienced, independent entrepreneur?*" In this empirical study, the team level was included in the analysis. The data used were collected among the same participants as described in Chapter 4. Task 2 of the OICAT (as discussed in Chapter 3) was used to compare individual and team performance. The main lesson learned from this study is that individuals and teams used different cognitive frameworks for identifying business opportunities. More importantly, the results suggest that the cognitive OI framework of the teams was more similar to the cognitive OI framework of experienced, independent entrepreneurs (see Baron & Ensley, 2006). The results thus suggest that team participation is valuable from the very start of the entrepreneurial process.

### 6.3 Main conclusion

In light of the central research question of this dissertation, *What characterises opportunity identification by employees on the individual and team level?*, the results suggest that OI deserves attention in existing businesses, both as a meaningful process leading towards new value-creation and as a relevant capability of employees. OIC is a multi-phased phenomenon consisting of two main competencies, namely business idea generation and business idea evaluation. These competencies do not correlate with one another and are consequently presented as two distinct competencies. Employees can have one of the competencies (business idea generation or business idea evaluation), or both of them. Organisations need employees that are able to generate business ideas and employees that are able to evaluate the potential success of business ideas. The results of this thesis suggest that, just like independent entrepreneurs, employees mainly acquire such competencies by a process of learning by doing; this means that employees should become involved in entrepreneurial activities on the shop floor. Creating teams can be a solution, bringing together the competencies needed for the successful identification of opportunities. Moreover, the results suggest that the



commitment of teams in the early stages of the entrepreneurial process is highly relevant, because the team cognitive framework for identifying opportunities seems more effective than the individual cognitive framework.

Taken together, at the defining, initial stage of the entrepreneurial process, opportunities are identified by individuals or, preferably, by teams – in a process by which business ideas are generated and evaluated for their potential success. When studying opportunities and their identification, scholars should take into account the differences in OIC between SMEs, employees, and even within OIC itself (i.e., between business idea generation and business idea evaluation). In practice as well, these differences should be considered in the selection and management of employees, in assessing OIC and in composing teams, because teams need both business idea generators and business idea evaluators. The results of this dissertation show that the entrepreneurial process deserves serious attention from the moment it begins: when ideas are being generated, and when it is highly valuable to make sure that employees are able to select and further explore those ideas with the most potential. Even at the very start of the entrepreneurial process, it is worth the effort to invest in entrepreneurship by composing effective teams.

This dissertation adds to the entrepreneurship literature by contributing to the understanding of a core construct in the field, namely opportunities and their identification (e.g., George, Parida, Lahti, & Wincent, 2016; Shane & Venkataraman, 2000; Suddaby et al., 2015). This dissertation also contributes to a better understanding of research on entrepreneurial competencies, by defining a specific entrepreneurial competence (i.e., OIC), which is measurable, involved in each entrepreneurial process, and relevant for daily work and life (e.g., Kyndt & Baert, 2015; Lee, Shim, & Lee, 2016; Mitchelmore & Rowley, 2010). The next sections contain the lessons learned about OI, and how OI can be characterised from a theoretical and practical point of view.

## **6.4 Reflections on the theoretical implications of the results**

As stated above, the goal of this thesis was to contribute to a better understanding of OI in relation to three research issues: (1) the OI process, (2) defining OIC, and (3) measuring OIC. Each of these issues, and the lessons learned in relation to these issues, is considered below in light of the research results.

### **6.4.1 The opportunity identification process**

The first research issue, mapping out the OI process, encompasses two main concerns: (1) what opportunities are, including the role of the discovery and creation views

regarding opportunities, and (2) how opportunities emerge and develop over time. This section starts with a discussion of the role of the discovery and creation views in OI; next follows an elaboration on the complete OI process.

*The discovery and creation views in the OI process*

Throughout this dissertation it has been argued that inputs were used from both the discovery (i.e., objective) and the creation (i.e., subjective) views on opportunities. Suddaby and colleagues (2015) elaborated on the differences between the discovery and creation views in their introduction to a special issue of the *Journal of Business Venturing* on entrepreneurial opportunities. In the discovery view, much is attributed to processes of imprinting: the continuous influence of the social, political and economic context, and the opportunity, on the individual. According to this view, opportunities are objective entities that are there to be “seen” or “discovered” by individuals who have a certain alertness to that opportunity – and that are overlooked by others. In the creation view, much is attributed to processes of reflexivity: here, individuals are central, aware of their own role in dealing with the social, political and economic context in which they are embedded. Individuals create an opportunity in their own imagination, in interaction with the environment and with others. Suddaby and colleagues (2015) state that, although the discovery and creation views differ substantially in how opportunities are approached, “both imprinting and reflexivity share a common assumption that entrepreneurial opportunity emerges as the result of a capacity of some actors [...] to perceive socially embedded schemas in unique and creative ways” (p. 9).

Their essay provides a brief overview of the key differences between the subjective and objective views and, just like other authors (e.g., Dutta & Crossan, 2005; Garud & Giuliani, 2013), they conclude that these views are not mutually exclusive. Accordingly, inputs from both views can be recognised in the present studies: in Chapter 4, OIC was explored from an entrepreneurial learning perspective, and in Chapter 5, OI was studied from a cognitive perspective. The entrepreneurial learning perspective contributes to understanding how individuals consciously interact with their social and business context, and how this effects their OIC. More specifically, in Chapter 4 the role of the individual, the influencing role of the context, and the interaction between the two was discussed, containing elements from both the discovery and creation views. The cognitive perspective contributes to the understanding of how cognitive frameworks, which are the result of experience, help individuals and teams to identify opportunities. As Suddaby and colleagues (2015)

argue, “socially shared cognition” (p. 9) is considered important from the discovery and creation points of view. Cognitions can be influenced by all kinds of context factors, and some individuals are able to overcome the “imprinted” cognitions and identify opportunities. Together, the presence of different epistemologies in the opportunity process indicate that OI is a multi-faceted, complex phenomenon which can be approached and explained from different perspectives.

#### *Charting the complete opportunity process*

Recently, Vogel (2016) published a conceptual article on the venture creation process, and more specifically on how ideas evolve into opportunities over time. He used influential work on opportunities, and literature from the fields of creativity and innovation management, to develop and propose a new model for framing the emergence of new ventures from the very first insights until their exploitation. Although the framework of Vogel (2016) focuses on new venture creation as outcome, the process underlying it has similarities with the opportunity process in existing firms. Consequently, the work of Vogel (2016) is used as a starting point for framing how the results and instruments of this thesis can be understood and positioned in the opportunity process. His conceptual framework is presented in Figure 6.1. Below is a discussion of the stages Vogel (2016) defines in his framework, and of how the results of this thesis relate to each stage. Additionally, as the Wood and McKinley (2010) opportunity production model was used in Chapter 2 to conceptualise the opportunity process, it is compared here to the framework of Vogel (2016).

The venture process starts with idea generation (in terms of Vogel [2016], “venture idea generation”). Resource push (e.g., customer need), market pull (e.g., commercialising resources), and desire to start (e.g., entrepreneurial ambitions) are the three triggers Vogel (2016) distinguishes for idea generation. According to Vogel (2016), scholars use different terms to refer to idea generation, including identification, the term used in this dissertation. He defined three paths via which ideas can be generated. The first of these paths is intentional idea generation: an individual actively searches for an idea because of a desire to do so (e.g., for product improvement). The second path is accidental discovery: an individual does not have the intention of generating an idea, yet occasionally finds one when looking for something else, or even accidentally. The third path is legacy: an individual gets an idea from somebody else. OICAT Task 1, business idea generation, clearly relates to the idea generation stage from the model of Vogel (2016). As described in Chapter 3, the participants were asked to generate business ideas based on a case about sustainable development. Because of the explicit

request to list business ideas, the task relates to a considerable degree to intentional idea generation. In the opportunity production model of Wood and McKinley (2010), the first stage is referred to as opportunity objectification. Here, an idea turns into an opportunity when it becomes an external reality for the individual. Consequently, opportunity objectification seems to go one step further than the simple generation of all kinds of ideas, by taking into account the cognitive shift individuals make when an idea is shared with others, and then acted upon (i.e., objectified) or not.

Subsequently, as explained in Chapter 3 and Chapter 5, the individual evaluates whether or not the idea has potential for a hypothetical other person (i.e., third-person belief). Vogel (2016) does not discuss this stage of the opportunity process explicitly. Instead, he refers to the development of a “venture concept” (i.e., incubation) as the stage succeeding idea generation. A venture concept can be compared with an initial business model which consists of the customer segment, need, and the resources and capabilities of the individual (Vogel, 2016). It is the core of Vogel’s framework, as it connects the idea to the opportunity. Business idea evaluation seems to be in between idea generation and the incubation sub-stage in which the venture concept is developed. It is considered part of OI, as discussed in Chapter 5. In Figure 6.1, the positions of business idea evaluation and OI are depicted in relation to the framework of Vogel (2016). Business idea evaluation is the stage referred to by, among others, McMullen and Shepherd (2006) and Wood and McKelvie (2015) as a third-person belief: whether or not an idea has potential for a hypothetical other person. OICAT Task 2, business idea evaluation, is related to this stage of the opportunity process.

Together, business idea generation and business idea evaluation seem to align with the opportunity objectification of Wood and McKinley (2010). After business idea evaluation, the idea objectifies into an opportunity acknowledged by others. Therefore, by adding business idea evaluation to the framework of Vogel (2016), the process model becomes more specific. Business idea evaluation demonstrates when OI stops and the incubation stage begins. It is also here, in between business idea evaluation and incubation, that the idea evolves slightly into an opportunity. By approaching opportunities and their emergence as a process, instead of as something that is suddenly there or a simple single-sight construct, a distinction can be made between idea and opportunity. Opportunities emerge as a result of a dynamic and complex process in which raw ideas are generated, elaborated upon, changed, refined and sometimes abandoned (Dimov, 2007b; Vogel, 2016; Wood & McKinley, 2010). In sum, when merging the findings of the current dissertation with the model of Vogel (2016) and Wood and McKinley (2010), the process (this far) could be described as (1) business

idea generation, (2) business idea evaluation (together: OI or opportunity objectification, measured by the OICAT), and (3) incubation, in which a business concept is being developed.

According to the results of Chapter 5, it is already in this early stage that the involvement of teams can be beneficial for the opportunity process. These results suggest that a cognitive framework, which is mainly the result of experience in identifying opportunities, helps individuals and teams to recognise which ideas are of good quality. Moreover, the results of Chapter 5 suggest that a team's cognitive OI framework is more effective for evaluating the potential of business ideas than is the individual cognitive OI framework, when compared in the light of the framework of experienced, independent entrepreneurs. Although a distinction between individual work and teamwork is not explicit in the framework of Vogel (2016), he does acknowledge in his article the role of teams by stating that individuals as well as founding teams can be involved in each part of the process. In the current dissertation, individual and team performance was only compared for OICAT Task 2, business idea evaluation. In future research, individual employees and teams could work with OICAT Task 1, business idea generation, in order to explore how team generation of business ideas compares with that of individuals, for instance in terms of the quantity and quality of the ideas.

It is up to this point that the process underlying opportunities was discussed and investigated in Chapters 2, 3, and 5. In Chapter 4, participants were asked: "How many new ideas from you (or your team) have been adopted by the management (resulting in a concrete project) either in whole or in part, during the last three years?" In response to this question, the participants wrote down only the number of ideas and did not note what kind of ideas were adopted by management. Accordingly, this measurement of OIC is considered less than precise. In the framework of Vogel (2016), it captures the complete venture idea generation stage, because the ideas could have been intentionally or accidentally generated, or generated by others (i.e., legacy). Furthermore, because the ideas were accepted by the management, they have been evaluated at least for their potential success for others (i.e., third-person beliefs). It is somewhat harder to determine whether the measure relates only to the idea generation stage, or also to the incubation stage of Vogel (2016). The stage of development that the idea is in at the moment of acceptance depends on the organisation. Presumably, only those ideas are accepted by management that are relevant and interesting for the organisation. The measurement is therefore considered to capture the first steps in the incubation stage. Overall, the measurement provided a way to measure OIC in its

specific context, namely the context of existing firms. More importantly, because in Chapter 4 OIC was the outcome variable of the tested model, a measurement was used that included an indication for a participant's performance (or success) in identifying opportunities. In future research, participants could be asked to describe the ideas that were adopted by management, and how the ideas developed over time. This would provide more insight into what kind of ideas are accepted by management, and the stage of development of those ideas.

Regarding the model of Wood and McKinley (2010), in which they refer to opportunity enactment as succeeding opportunity objectification, opportunity enactment seems to match the incubation stage of Vogel (2016). In opportunity enactment, the individual shares the idea with relevant stakeholders, and aims to further design the opportunity into (for instance) a concrete product, process, service or business model.

After incubation, the model of Vogel (2016) proceeds with the opportunity evaluation and exploitation stage. In opportunity evaluation, individuals evaluate whether or not the opportunity has potential for themselves, or for the company for which they work (i.e., first-person belief). In the model of Vogel (2016), evaluation is part of the incubation cycle, and is acknowledged as a highly important stage in which the individuals have to decide critically whether or not they want to act further upon the opportunity. Although the name of OICAT Task 2, business idea evaluation, seems to suggest that it is similar to opportunity evaluation, this is *not* the case. The evaluative character in OI is related to someone's consideration of whether or not an idea could be a potential opportunity for a hypothetical other person. Although the terms business idea evaluation and opportunity evaluation can be somewhat confusing, the former refers to third-person beliefs (for a hypothetical other person) and the latter to first-person beliefs (for myself or the organisation I work for) about the potential of an opportunity.

Finally, the exploitation stage starts, in which the individual experiments with prototypes of the new product, process, service or business model pertaining to the business opportunity. It is the individual who decides when to start experimenting, and to what degree the opportunity and its corresponding business model are fully developed at the moment of experimenting (Vogel, 2016). Together, incubation, evaluation and exploitation are sub-stages of "venture opportunity development and exploitation" in the model of Vogel (2016).

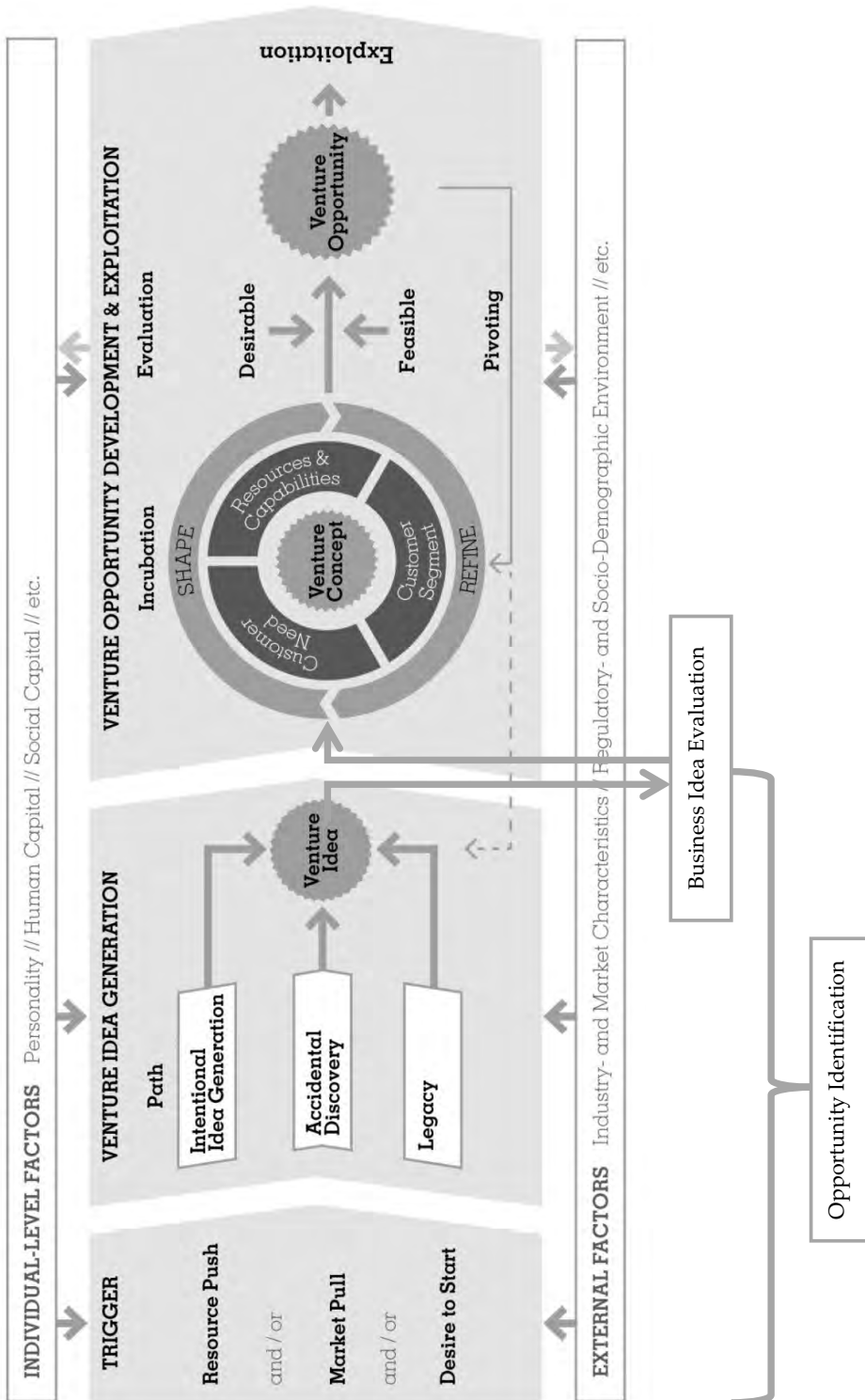


Figure 6.1. The framework of Vogel (2016) of the process underlying new venture creation, adapted based on the results of this thesis.

### 6.4.2 Defining opportunity identification competence

Charting the OI process yields insight into what opportunities are and how they come into being. Accordingly, the role of employees in the OI process is an explicit component of this thesis' research interest, and the capability of employees to identify opportunities was its main construct, approached from a competence theory perspective. As Mulder (2014) states: "A competency is a part of generic competence; it is a coherent cluster of knowledge, skills and attitudes which can be utilized in real performance contexts" (p. 111). As explained in Chapter 2, knowledge, skills and attitude components can be recognised in OIC. As a capability, OIC consists, according to the results of the current dissertation, of the main competencies of business idea generation and business idea evaluation. As stated in Chapter 1, two characteristics of competencies are that (1) individuals can develop competencies (Kyndt & Baert, 2015) and (2) competencies are always connected to a certain context (Biemans et al., 2009). In light of these two characteristics, it is considered relevant and interesting to elaborate on the questions: to what extent does evidence show that individuals can develop OIC? And secondly: to what extent do a variety of individual employees need OIC?

#### *Developing OIC*

The results of Chapter 4 suggest that those who have confidence in their own ability to think of new ideas, and who actively engage in entrepreneurial activities on the shop floor (i.e., EEA), get significantly more ideas adopted by their management. These results point towards the influencing role of the business context in OIC. Moreover, in Chapter 4, OIC was approached from an entrepreneurial learning perspective. As discussed in this chapter, entrepreneurs often learn by doing (Cope, 2005; Wang & Chugh, 2014). The result in Chapter 4 that EEA was the most important explaining variable of OIC suggests that learning by doing is also important in the context of existing businesses. These results tentatively confirm the notion of OIC as something employees can develop, for instance by participating in entrepreneurial activities.

Other studies have been conducted to investigate whether individuals can develop OIC. For instance, DeTienne and Chandler (2004) showed in their empirical study that individuals can generate significantly more ideas and more innovative ideas when they receive training. As well, the results of the study conducted by Karimi, Biemans, Lans, Aazami, and Mulder (2014) suggest that OIC can be developed. In their quasi-experimental pre-test/post-test design with a control group, they offered creativity exercises and activities to the participants from the experimental group. The results show that the participants from the experimental group generated a greater



number of business ideas and more innovative business ideas after they had received training, and also as compared to the control group.

Based on the results of the current dissertation, it is not possible to conclude without a doubt whether it is truly possible to develop OIC. Still, in line with the studies of DeTienne and Chandler (2004) and Karimi and colleagues (2014), the results lend credence to the notion that OIC can be approached as a capability, something people can learn and develop. In the context of existing businesses, longitudinal research is desirable to investigate whether employees can develop and improve their OIC over the long term. Entrepreneurial employees who actively participate in entrepreneurial activities could also be followed for a longer period of time, in order to explore the development of their OIC.

#### *Who needs OIC?*

In the current research, employees fulfilling all kinds of jobs and roles were invited to participate in the assessment. Beyond the methodological advantages of mixed groups (i.e., creating comparable groups among organisations), all types of employees were invited because of the expectation (as mentioned in Chapter 1) that people with various backgrounds are involved in entrepreneurship (Desjardins, Lans, & Ederer, 2016; Toner, 2011). However, the question remains whether all employees should have OIC to the same extent, or that some employees can benefit more than others from having such competence.

Bosma and colleagues (2013) found that only about 5% of the adult population is involved in EEA. Entrepreneurial employees are often (1) managers, (2) professionals, or (3) technicians and associate professionals. By far the biggest group of entrepreneurial employees are managers, likely because of their desire for and role in promoting entrepreneurial behaviour among their employees (Bosma et al., 2013). A comparable impression of entrepreneurial employees is conveyed in literature on the realisation of innovation in businesses. In her study, Olsen (2016) investigated the link between learning processes and innovation. She asked the opinion on this topic of employees “working in environments that focus on innovation and in environments which focus on learning and competence development” (Olsen, 2016, p. 213). Participating in the research were HR managers, and (project) managers and employees in R&D and product development; this set of participants demonstrates who Olsen expects to be involved in innovation and learning. Støren (2016) defined in her study the “innovative strategic learner” (p. 181). These are people who “keep themselves updated, are curious, are able to learn something new from the work they

do, use previous knowledge strategically, like to get to the bottom of difficult things, and in addition, quite frequently solve complex problems at work” (p. 181).

Although innovation and entrepreneurship are different concepts, the literature on innovation does help to get a better grasp on who is involved in entrepreneurship. From a research point of view, scholars seem to expect that especially employees with responsibilities having to deal with complex problems are involved in entrepreneurial activities. Consider, for instance, managers, and R&D and HR professionals. Beyond these professionals, it might depend on the context of the organisation and the purpose of the employer to what degree (other) employees need OIC. In innovation-driven organisations, the need for OIC is expected to be higher than in production-oriented organisations that rarely innovate. Also at knowledge-intensive organisations, for instance, OIC should be present among a broad range of employees, because knowledge develops quickly and consequently employees have to be able to deal with an ever-changing environment.

From the perspective of employees, many factors determine whether or not they are able and willing to identify opportunities. These factors include, for instance, the working environment (e.g., degree of complexity of work), how employees feel about generating ideas (i.e., creative self-efficacy), the activities in which they participate (e.g., involvement in entrepreneurial activities), and prior knowledge in a given domain. As discussed in Chapter 2, OIC is related to a specific domain, and prior knowledge in a domain helps the individual to identify an opportunity in that specific domain (Shane, 2000). Beyond these personal and organisational factors, it may also depend on the nature of employees' contracts whether or not they are able and willing to identify opportunities. For instance, temporary (agency) workers and seasonal workers might want to identify opportunities mainly for themselves, as a way to stay employable. Employees with such contracts might feel an urgency to identify opportunities to explore possible career paths. OIC can be used by employees in different ways and with different goals in mind.

In sum, the literature suggests that not every employee needs entrepreneurial competencies to the same extent. Some employees can benefit more than others from OIC, as when identifying opportunities is part of their job (such as among managers and R&D professionals) or important in the context of their own career. Nevertheless, OIC is considered a worthwhile competence domain for all employees, because it is at the core of the entrepreneurial process. Entrepreneurship always starts with the identification of an opportunity. Consequently, OIC can be valuable for other employees who could think of ideas such as how the production cycle can be made

more efficient, how products can be improved, or what markets are interesting for future sales. This was recognised during the data collection on this project, as employees with an array of backgrounds enjoyed working on the assessment, and were able to contribute to the team work to some extent. Although some employees did not seem to feel comfortable working on the tasks, that was not directly related to their functional background, but rather seemed to be a matter of personal interest. In conclusion, OIC is considered relevant for all workers, though there can be OIC differences between production workers who might need less developed OIC, and managers, R&D professionals and temporary (agency) workers who might need better developed OIC. Both the expectations and goals of the employer, and the personal goals and desires of the employee determine to what degree employees have OIC.

### 6.4.3 Measuring opportunity (identification) competence

For the current thesis, the opportunity identification competence assessment test (OICAT) was developed to measure OIC (see Chapter 3). The OICAT consists of the following tasks:

Individual tasks:

1. Task 1, business idea generation – ten minutes (as tested in Chapter 3)
2. Task 2, business idea evaluation – five minutes (as tested in Chapter 3 and used in Chapter 5)

Group tasks:

1. Task 2, business idea evaluation – ten minutes (as tested and used in Chapter 5)

The student participants in Chapter 3 worked on individual Task 1 and Task 2. The employee participants in Chapter 5 worked on Task 2 individually and as a team. Data collection took about three hours for the participants, because the OICAT was part of a larger research project (as stated in Chapter 5).

Regarding Task 1, business idea generation, the ideas generated by the students were scored on comprehensibility, concreteness and flexibility (see Chapter 3). The results showed that the Dutch life sciences master's students outperformed the Portuguese students who had just started their bachelor's programme in sports. The scoring protocol for the ideas was derived from the creativity literature (i.e., Guilford 1967); this is in line with what Vogel (2016) advocates, as he recommends using inputs

from creativity to investigate the quantity, quality, and variety of ideas. Comprehensibility seems to relate to the number of generated ideas (i.e., quantity), and flexibility to the variety of ideas. Concreteness could relate to the quality of ideas, but the results in Chapter 3 showed that many comprehensible ideas were also concrete (Dutch students: 92%; Portuguese students: 84%). In future research, scholars could search for stronger indicators, such as innovativeness, for the quality of the ideas. For instance, DeTienne and Chandler (2004) used a six-point scale to determine the innovativeness of the ideas. Although it is hard to objectively score each idea along a six-point scale, it does provide a specific measure for the quality of the ideas. In future research, OICAT Task 1 could be applied among business participants in order to investigate the quality and variety of ideas generated by employees. Their relationship to EEA could be tested, as well as self-perceived creative self-efficacy and other constructs with a proven role in OIC (see the results of Chapter 4). It would, for instance, be interesting to know whether the number of generated ideas positively relates to the quality of the ideas. In that case, only the number of generated ideas could be scored in future research, which is less time intensive. For the practical setting, insight into such results would help to determine strategies for stimulating employees to think of and share ideas (i.e., as many as possible, or only a few).

Taken together, the tasks from the OICAT can be used to investigate business idea generation (individual level) and business idea evaluation (individual and team level). As stated earlier (see pages 107-108), the tasks do not measure the subsequent stages in the entrepreneurial process, namely opportunity incubation and evaluation. Vogel (2016) describes the incubation stage as “an entrepreneurial learning process” (p. 12), in which the opportunity is further developed, acted upon, experimented with, and refined. In future research, this stage could be investigated using the Business Model Canvas (BMC) of Osterwalder and Pigneur (2010). The BMC is a helpful tool for gaining insights into ideas behind new ventures or existing organisations. It consists of nine building blocks, each depicting a crucial part of the organisation. In future research, participants could work in teams with the BMC to explore opportunity incubation. More specifically, teams could be asked to develop a business case in a relatively short time (e.g., 20 minutes). By using markers and post-its, participants could be forced to formulate keywords to summarise their business idea. Furthermore, coloured post-its could be used to illustrate relationships between the building blocks of the model. The post-its could, for instance, be scored on quantity (e.g., less is more), concreteness (e.g., use of key words), relationship between post-its (e.g., as indicated by the colours), or specificity (e.g., “children” as customers as opposed to “everybody”).

Additionally, only the post-its in some of the building blocks could be used for the analysis, for instance, in line with the dimensions from the incubation stage of Vogel (2016). As stated before, these dimensions are the customer segment, need, and an individual's resources and capabilities.

Next, the opportunity process becomes more personal in opportunity evaluation, when individuals consider whether an opportunity could be a potential opportunity for themselves or the company where they work. It is in this stage that individuals decide whether or not to act upon the opportunity, to further explore it and develop it into a new product, process, practice or service. In future research, the OICAT could be extended by adding a task measuring the first-person beliefs of participants with regard to opportunity potential. This could be achieved, for instance, by designing an open-ended task in which participants could be asked to formulate arguments for why they would (or would not) act further upon an idea. Alternatively, if participants were first to work on the OICAT Task 1, and generate business ideas, they could formulate arguments for why and which self-generated idea they would further explore, and which not (and why).

Longitudinal research could be interesting in order to map the complete opportunity process, from its very start until the exploitation stage. Entrepreneurs as well as entrepreneurial employees could participate in such research. Vogel (2016) suggests using communication technology as an assessment tool. For instance, apps could be developed in which participants could easily keep up on their daily activities, for instance by writing short blogs, by photographing important learning moments, by videotaping their own experiences as they tell about them, or by recording important moments of the day. Especially in longitudinal research, such assessment tools could provide new and rich insights into the opportunity process. Finally, it must be stressed that the process underlying opportunities is complex and multidimensional, and therefore it is of crucial importance for future scholars to precisely define what part of the opportunity process they are to investigate (Vogel, 2016).

Overall, at least part of the OICAT appeared to be applicable among a wide range of participants (i.e., students and employees working for different businesses), it generated useful results for research and was positively evaluated in practice. More specifically, the assessment results provided different information than, for instance, questionnaires or interviews. From an educational perspective, the OICAT aligns with the development from "assessment of learning" towards "assessment for learning" (Lans & Gulikers, 2010) meaning that assessment is not only used to determine whether

or not individual learners are successful, but also to provide rich and constructive feedback to learners about their competence development. Consequently, assessment becomes meaningful, and a component of instruction (Dochy, 2009). The OICAT can be used as a learning-oriented assessment tool, providing participants with insight into what they can do and what competencies need further development in order to become a better professional in the future. The tasks from the OICAT challenge the participants to think about actual cases and to apply knowledge to solve complex problems, which is characteristic for new forms of assessment (Baartman, Bastiaens, Kirschner, & van der Vleuten, 2006; Dochy, 2009).

The learning-oriented character of the OICAT was recognised by the respondents who participated in the current PhD project. The general impression during the data collection was that the participants positively evaluated working on the assessment. This was confirmed by HR consultants from a large consultancy agency who participated with their team in the assessment. With two of these HR consultants, the OICAT was evaluated and the added value of the assessment for companies was discussed. They emphasised that they appreciated the personal character of the assessment, as employees from all departments were invited to participate. Furthermore, they enjoyed the dynamics between individual and group work, and appreciated that they got the opportunity to talk about entrepreneurship with colleagues and to exchange ideas. As they put it, the OICAT is not just a psychological test; it challenges people to get involved with, and show commitment to, the team and organisation they work for. Moreover, the results of the OICAT and the questionnaire were discussed with each company, in order to give feedback on how their employees experienced the learning opportunities in the organisation, and how they scored on the assessment. The feedback included mean scores of the individuals and teams, and a benchmark with the other participating organisations (that is, confidentially, without sharing any personal test results).

Still, in order to use the OICAT in education as an assessment instrument, further development of the instrument is desirable. Baartman and colleagues (2009) present a complete overview of criteria for new assessments, which could be used to further develop the assessment. For instance, for use in education the criterion transparency would deserve more attention. To make the OICAT more transparent, the scoring criteria and purpose of the assessment should be clear to the learner. Because OIC is a specific entrepreneurial competence that can be useful for many future workers, it is considered worthwhile investing in the further development of the OICAT, so that it can fulfil a formative and summative assessment function in the future.

## 6.5 Limitations and the future research agenda

The studies making up the current dissertation were conducted in specific contexts, among certain participants and using, in part, self-developed instruments. This section elaborates limitations of the studies not discussed above and also proposals for future research directions.

First of all, the specific contexts in which two of the empirical studies from the current dissertation were conducted, namely existing firms in the Netherlands and one in Germany, and mainly SMEs (see Table 4.1), are laden with their own limitations. As stated in the introduction, SMEs generally have limited access to resources, and HR practices are often rather informally organised, focusing on the short term (Desjardins et al., 2016; Saru, 2007). Most of the companies were active in the agro-food industry, where male employees predominate (76.1% of the participants were male) and generally a relatively large proportion of the organisation works in production. Furthermore, all businesses were interested in entrepreneurship and participated in the research project on a voluntary basis. Because of the specific context of the enterprises, the results might not be generalisable, for instance, to multinationals or to SMEs from other industries and countries. Nevertheless, the OICAT was designed in such way that it would be applicable among a diverse group of participants. In addition, the results of Chapter 3 show that the OICAT can be used to track individual differences. Therefore, in future research the OICAT could be applied in different contexts to explore whether or not scores differ among independent entrepreneurs, employees working for multinationals, or employees working in different countries or industries.

The second set of challenges involved keeping the circumstances of data collection similar across organisations. As explained in Chapters 4 and 5, decisions on who was invited to participate in the assessment were always made in collaboration with the organisation. Still, the contact persons from the companies (i.e., an HR professional or a member of the management team) had different strategies for inviting their employees. While employees at some organisations were obliged to participate in the assessment, at others employees were given the opportunity to sign up voluntarily. Furthermore, collecting the data was like a military operation. All participants had to work on each task for exactly the same amount of time, individually and as a group. Employees had to be quiet when working on the individual tasks, and had to work under time pressure. For some employees this was a challenge and they did talk (e.g., “what a difficult task!”, “are you ready?”, or “I need coffee!”), disturbing the others. Some teams did not agree upon the time for a task and tried to slow down the procedure. Still, many circumstances were uniform: the assessment was always held at the

organisation, all data were collected by the same person, the procedure was the same at each organisation, and all employees worked in mixed groups. In sum, it was a deliberate choice to bring people with different backgrounds together for the data collection, and to let them work in mixed teams. Despite the disadvantages that might have caused bias, the participants enjoyed working on the assessment. They appreciated having the opportunity to work with colleagues they normally do not work with, spending time together, and jointly thinking about new business ideas. To avoid disturbances in future research, data could be collected among more homogeneous groups, including employees who are more familiar and comfortable with the process of identifying opportunities.

The third area touching on limitations regards the results in Chapter 4, the study in which different antecedents for OIC were investigated on the personal and organisational level. Although a relationship was found between OIC on the one hand and self-perceived creative self-efficacy and EEA on the other, it was rather surprising that other relationships were not found in the data. For instance, the relationship between OIC and self-perceived social networks, entrepreneurial experience and entrepreneurial intentions was not significant. This is contradictory to earlier research in which the role of such antecedents in entrepreneurship was found (e.g., Harrison & Leitch, 2005; Krueger, Reilly, & Carsrud, 2000; Rideout & Gray, 2013; Wang, Ellinger, & Wu, 2013). A possible explanation for the lack of relationships might be that variables such as entrepreneurial experience and entrepreneurial intentions might play a different (perhaps indirect) role in OIC in the context of existing businesses, or that such variables play a more prominent role in the later stages of entrepreneurship. Furthermore, another, more distant measure of OIC was used in Chapter 4, as participants were asked only to write down, without any further explanation, the number of ideas accepted by the management. Finally, here as well, the fact that employees fulfilling all kinds of jobs and roles were invited for the assessment might have influenced the results. For instance, complexity of work might have had a different influence on the work of an R&D professional compared to that of a production worker. In future research, the antecedents of individual OIC could be further mapped. In line with what was suggested on page 108, participants could be asked to explain what kind of ideas were accepted by the management, how these ideas developed over time, and what kind of ideas were rejected by the management. Consequently, the measurement of OIC would provide more complete and specific insight into the OIC of employees. It could also help here to work with more



homogeneous groups of participants, to gain more insight into the antecedents of specific groups of professionals.

The fourth issue deserving further attention concerns the investigation of teams. During the data collection, participants were randomly assigned to teams. Consequently, the team members did not share a working history. As a result, all groups were of the same size (in this case, four or five persons), and all groups were mixed (including employees with different backgrounds) and, as such, comparable between organisations. However, a limitation of this choice was that the team composition was complex for investigating team antecedents – which would have been interesting in order to reach a better understanding of OI on the team level. It is questionable whether the teams that participated in this project can actually be considered authentic teams. In defining teams, Decuyper, Dochy and Van den Bossche (2010) refer to Cohen and Bailey (1997), who define a team as “a collection of individuals who are interdependent in their tasks, who share responsibility for outcomes, who see themselves and who are seen by others as an intact social entity embedded in one or more larger social systems” (p. 241). The teams in the current dissertation do not meet these criteria. Nevertheless, it would be interesting to investigate what effect team history has on ability to identify opportunities. Do mixed teams, without working history, identify more, and more innovative, opportunities in comparison to homogeneous teams that have worked together for a longer period of time? Such research could reveal what kind of teams (or groups of people) generate the most useful ideas in a relatively short amount of time. OICAT Task 2, business idea evaluation, and the proposed group task with the BMC (see pages 114-115) could be applied among different sorts of teams and, accordingly, used to map the opportunity process. The results could be related to potential individual and team-level antecedents for team OI, such as team homogeneity (or heterogeneity) and working history.

The fifth point is that, beyond investigating the relationship between team OI and its antecedents, it would be interesting to investigate the relationship between OIC and performance. In Chapter 4, OIC was the outcome variable of the statistical model, and therefore the measurement included an indication of performance for identifying opportunities. However, based on the studies here, it is not clear to what kind of business outcomes the identification of opportunities relates. For instance, it would be valuable to gain insight into what happened with the ideas that were adopted by management. Are employees whose ideas are adopted by the management also employees who contribute significantly more to the innovative performance of the organisation? Do employees with highly developed OIC contribute more to financial

benefits for the organisation, compared to those who have only limited OIC? Wang and colleagues (2013) investigated the relationship between OIC and individual innovative performance, as perceived by their supervisors. They found a positive, significant relationship between the two. This makes a relationship between OIC and performance likely. In future research, individual and team OI could be linked to relevant performance outcomes. These outcomes could be broader than innovation, and could relate to (profitable) new value-creation for the organisation. The measurement used in Chapter 4 could be extended not only by asking participants what kind of ideas were adopted by management (see page 118), but also by asking management how many of the ideas were eventually implemented.

## 6.6 Reflections on the practical implications of the results

In this section, the practical implications of the results of the current thesis are discussed on three levels: SME, higher education, and policy. In addition, insight is presented regarding what is currently happening on the policy and higher education level. Some of the recommendations related to the SME level have been formulated in the context of the LLLight'in'Europe research project, and can be found on its website (see [www.lllightineurope.com/reports/](http://www.lllightineurope.com/reports/)). The practical implications are mainly relevant for and geared to the situation in the Netherlands.

Before proceeding to the implications, it must be stressed that it is not the intention here to give a complete overview of what is happening in the field, nor to offer a complete set of recommendations. Instead, the main goal of this section is to open up the discussion on the meaning of entrepreneurship, and specifically of OI in practice, and to provide guidelines and ideas for how entrepreneurship could be further implemented as a valuable human capital asset for society.

### 6.6.1 Small and medium-sized enterprises

Not every business involved in this research can, strictly speaking, be considered an SME in terms of size (i.e., 2 of the 12 businesses had more than 249 employees). Yet, as argued in Chapter 4, all participating businesses faced similar challenges which are considered characteristic for SMEs. Therefore, the practical implications of the current dissertation are considered mainly relevant for SMEs and the recommendations formulated in this section are geared towards SMEs.

As discussed in the section “Developing OIC”, evidence suggests that identifying opportunities is something employees can learn. An important question from the SME perspective is then: how can employees learn to act entrepreneurial, and, more

specifically, learn to develop their OIC? And what can employers do to facilitate such learning processes?

*People with various competencies are needed from the start of the entrepreneurial process*

The results suggest that employees with differing competencies are needed in the OIC domain: both employees who are able to generate business ideas and employees who are able to evaluate which ideas have potential and therefore deserve further exploration.

In order to recruit and retain the right people, SMEs could look for persons with diverse abilities during selection processes. During job interviews, job applicants could be asked to provide examples of opportunities identified in the past, and of their role in the entrepreneurial process. More specifically, questions that can be helpful are related to past experiences with, and their role in, activities such as product improvement, new business development, optimisation of processes, and acquiring new knowledge. In addition, job applicants could be asked how they prefer to do their work, in order to ascertain whether applicants look for interactions with others, aim to learn from their colleagues, and are open to networking activities within and outside the organisation. These kinds of questions can help to discover whether people tend to brainstorm and think freely or whether they tend to lend structure and direction to the entrepreneurial process. Furthermore, although employers might consider them more relevant for a specific group of employees, such as managers and R&D professionals, such questions can be asked of job applicants for a wide range of jobs and roles (see in the section 6.4.2, “Who needs OIC?”).

For long-time employees, activities could be organised to discover what role employees fulfil in the entrepreneurial process. As a side-effect, such activities could contribute to realising new product development, and the further development of existing products, services, and processes. For instance, employees working for various departments (e.g., in finance, R&D, management, HR, marketing, or on the shop floor) could be invited to work together on the exploration of business ideas by using the BMC (Osterwalder & Pigneur, 2010; see page 114 of this thesis). Job rotation could contribute to creating a more flexible workforce, and could be used as a way for employees to gain insight into what their colleagues do. Stimulating collaboration within departments and across colleagues fulfilling similar jobs may help employees to see alternatives for how to perform their jobs.

*Engage employees in entrepreneurial activities, have confidence in their ability to act entrepreneurial, and create a work environment that fosters identification of opportunities*

The results of the current dissertation suggest that employees who actively engage in entrepreneurial activities have better OIC. Accordingly, actively involving employees in tasks such as product and service development, and stimulating them to improve work practices, to acquire new knowledge as well as new groups of customers, can contribute to their performance in the entrepreneurial process. It is helpful if employees experience the freedom to engage in such activities and to share their ideas with others.

The results further suggest that employees who have confidence in their own creativity and ability to conceive new business ideas are more likely to identify opportunities. Consequently, supervisors could communicate faith in employees' ability to cross boundaries and think of new ideas. As some employees might not feel comfortable generating ideas and sharing them, employers could select early adapters who are willing to act as idea generators and evaluators. These employees could actively look for opportunities and discuss them with their colleagues, so that these colleagues get involved in entrepreneurial processes without necessarily having to take initiative themselves.

Direct evidence was not found for the role of the work environment in OIC. Nevertheless, the results suggest that the work environment can foster entrepreneurial behaviour. In additional analyses (which were conducted for LLLight'in'Europe) it was found that those employees who got three or more ideas accepted by management in the previous three years more often faced complex problems in their daily work that take at least 30 minutes to find a good solution – in contrast to the group that introduced fewer ideas. Furthermore, a relationship was found between the acceptance of ideas and the specificity of instructions employees received regarding the process of performing daily tasks. If employees got six ideas or more accepted by management, they had received only general instructions or had had the freedom to decide how they would prefer to perform their tasks. These findings are discussed in the policy report written for the European Union (EU; see Lans, Biemans, & Baggen, 2015). Together, these results suggest that employee performance in the entrepreneurial process can be positively influenced by the complexity of their work and the freedom they have in how they do their job.

*Foster teamwork from the very start of the entrepreneurial process*

From a conceptual point of view as well as from empirical evidence, the importance of involving teams in the entrepreneurial process is evident. Teams are not only valuable

in the context of entrepreneurship, but can also help in becoming a flexible organisation (Decuyper et al., 2010). In the current dissertation, mixed teams participated in the assessment, including employees from the shop floor on up to the management team. Depending on the business context and organisational goals, employers can consider who they would prefer to commit to the entrepreneurial process. The results of this thesis underline the importance of involving teams from the very start of the entrepreneurial process, namely in identifying potential business opportunities. Because of the different competencies that are involved in OI, teams could include employees who are able to generate ideas and employees who are able to evaluate which ideas have the most potential and deserve further investigation.

*There is no “one-size-fits-all” approach*

Finally, it is important to realise that HR practices should be organised in a way suitable to the organisation. There is no “one-size-fits-all” approach. Each organisation is different, and has different needs. How to structure activities depends on the nature of the organisation. For instance, it depends on the educational level and background of the employees, the organisational culture, the structure, the size of the organisation, and so on. Accordingly, HR professionals should carefully consider what kind of activities suit the organisation. Because of the complexity and the importance of HR, it is recommended that at least one person in the organisation have the time and resources to organise learning activities and to support employees’ professional development. Because at many SMEs the resources for building up a solid HR system are not at hand, external agencies could play a supporting role here; this will be discussed in the section “6.6.3 Policy”. More suggestions for activities can be found on the website of LLLight’in’Europe (see [www.lllightineurope.com/simulation-tools/](http://www.lllightineurope.com/simulation-tools/)). Regardless of size, the intention can be similar: an intention to support employees in their learning processes, their professional development, and their willingness and eagerness to act entrepreneurial and identify opportunities.

In Chapter 1, Schut Papier was introduced as an illustrative case of an SME where the importance of entrepreneurship is acknowledged. Because it appears that, at this firm, many of the recommendations as discussed in the practical implications were applied, Schut Papier is again presented here, as a case illustrative (6.1) of how entrepreneurship can be organised within an SME.

### Illustrative case 6.1 Schut Papier

According to the director, the following factors contribute to the entrepreneurialism of Schut Papier:

For opportunity identification:

- Actively investing in social networks:
  - Actively searching for opportunities (via others and via the internet).
  - Flexibility: three employees (including the director) are in charge of daily work, and the hierarchy is rather flat. As a result, the employees work as one big team and the organisation is flexible.
- Personal contact: every day, a short meeting is held to evaluate the previous 24 hours and to look ahead to the coming day. The director visits the paper mill daily and talks to the employees to ask how they are, find out how things are going, and hear their opinion on relevant topics.
- Room for experimenting: in one example, a new employee had to learn how to colour paper, which an experienced employee can do within half an hour. Even though a new employee takes four hours to create the right colour, the employee was given the opportunity to learn and experiment.
- Autonomy: employees are encouraged to act responsibly and autonomously. Because the paper mill is growing, two new employees have been assigned to fulfil a supervisory role over the employees working on the shop floor. The new employees will train their colleagues and help them deal with new situations so that their independence will increase.
- Employee selection: when selecting new employees, the learning attitude of the applicant is at least as important as the knowledge he or she has. Learning attitude is defined as “interactive, pro-active, searching for solutions, and passionate”.

### 6.6.2 Entrepreneurship education in higher education

In higher education, several initiatives exist in relation to entrepreneurship education (EE). Some of these initiatives are described below, before proceeding to suggestions and ideas to further implement entrepreneurship and OIC in higher education.

In 2011, Gibcus, De Kok, and Overweel published a report on behalf of Panteia, on entrepreneurship in higher education. They reported on an evaluation of six centres for entrepreneurship, connected to higher education institutions, that have been started in the Netherlands. By these centres, several entrepreneurship programmes have been developed and are being taught at universities and at universities of applied science. The Dutch government subsidised the establishment of these centres and other initiatives in EE in a programme on “entrepreneurship and education”, running from 2007 until 2013.

The entrepreneurship centres developed courses on entrepreneurship and extracurricular activities, such as inspirational lectures, summer schools, and conferences. The courses are mainly offered to the students in the final years of their bachelor’s and master’s programmes. The financial business model of most universities is structured in such a way that, during students’ first years of study (when almost all courses are compulsory), it is not profitable to offer them courses from other departments. This makes it difficult to offer entrepreneurship courses in the first years of study. Still, the centres for entrepreneurship are considered successful (Gibcus et al., 2011). There is increased attention to entrepreneurship in universities, and students feel more motivated to start their own venture.

Gibcus and colleagues (2011) noticed that most entrepreneurship programmes mainly focussed on independent entrepreneurship, rather than developing an entrepreneurial mindset. Lackéus, who published a report in 2015 on EE called *Entrepreneurship in education, what, why, when, how?* on behalf of the Organisation for Economic Co-operation and Development (OECD), paints a similar picture of EE. In his report, he focuses on EE in general, across educational levels. He notices that most scholars investigating EE use a narrow definition of EE in which new start-up creation is central. Moreover, most EE programmes teach students *about* entrepreneurship: students learn to understand entrepreneurship mainly from a theoretical point of view (Lackéus, 2015). In the broad definition of EE, the focus is on value-creation in general. In short, from the perspective of the narrow definition, students are supported to become an entrepreneur. From the perspective of the broad definition, students are supported to act entrepreneurial and acquire entrepreneurial competencies, which they

can use in working life. Most entrepreneurship programmes seem to focus on the first, supporting students to become an entrepreneur themselves.

Although significant steps have been taken to promote and implement EE, there is still room for improvement. Elaboration on several implications for EE in higher education follows below. These implications stem from the studies conducted for this thesis.

*A broad definition of EE should be used, in which value-creation is central*

In Chapter 3, a broad definition of EE was used: “[c]ontent, methods and activities that support the development of motivation, skill and experience, which make it possible to be entrepreneurial, to manage and participate in value-creating processes” (Moberg, Barslund Fosse, Hoffman, & Junge, 2014, p. 14). In this definition, value-creation in general is central. EE could support students in learning to create value, which can be roughly divided into routine value-creation and explorative value-creation (Lackéus, 2015). The former is about “process management and execution, optimization and incremental improvements” (Lackéus, 2015, p. 11). The latter, explorative value-creation, is about radical value-creation, as in the case of independent entrepreneurship. Balancing between the two is desirable yet difficult to realise. Routine value-creation results in short-term successes and can be used on a daily basis, whereas explorative value-creation is needed to develop radical innovations. Because of the quick results, the focus is often on routine value-creation. In educational programmes, activities could be designed that relate to both routine and explorative value-creation.

*Entrepreneurial behaviour should be fostered among students by teaching through entrepreneurship*

Acting entrepreneurial is of increasing importance because of the rapidly growing complex world we live in, caused by developments such as globalisation and technological change (Lackéus, 2015). Everyday life is characterised by dynamics and discontinuities. Or, to put it in the words of Gibb (2002): “Individuals as consumers, workers and as members of families [...] face greater levels of uncertainty and complexity in their lives” (p. 136). Entrepreneurial competencies can help future workers in dealing with complexity and uncertainty (Gibb, 2002). Therefore, these competencies are considered relevant for all students in higher education. The results of Chapter 4 showed that especially learning by doing, in other words actually getting involved in entrepreneurial activities, helps to identify opportunities. Accordingly,



students could be taught *through* entrepreneurship, meaning that learning activities in education (related to all kinds of subjects) are interwoven with entrepreneurial characteristics, so that students can learn by doing. Centres for entrepreneurship could focus on offering programmes aimed at preparing students to become an entrepreneur, and education in general could be adjusted in such a way that students develop a more entrepreneurial mindset. Examples of characteristics of EE that could be relevant for all students are collaboration within and outside the institute, focusing on creating value, working with “opportunities” instead of “problems”, innovativeness, and newness.

Because of the complexity of EE, teachers could be trained in how to become entrepreneurial teachers. Based on their evaluation of the centres for entrepreneurship, Gibcus and colleagues (2011) conclude that many teachers do not feel acquainted with entrepreneurship, but are rather resistant. This is caused by a lack of time for getting actively involved in entrepreneurship, by the fact that it is different from their own discipline, and/or because they do not see the relevancy of entrepreneurship. Additionally, many teachers do not realise that entrepreneurship is about more than simply writing a business plan (Gibcus et al., 2011). Therefore, a great task and challenge for entrepreneurship centres could be to develop and offer train-the-teacher programmes, in which teachers can experience the relevance of entrepreneurial competencies, and learn how they can teach such competencies. Here, OIC could be used as a specific entrepreneurial competence. The notion of entrepreneurial competencies can be rather vague; because OIC is a concrete competence domain, it can help teachers to make sense of what they and their students could learn in the context of entrepreneurship. Moreover, OIC is relevant for many students, as it is not only needed in new start-up creation, but is germane to all kinds of value-creation processes (both routine and explorative). Accordingly, OIC can be useful in many courses, discipline-specific and otherwise.

An example of an activity to involve teachers in EE is “GO!” (in Dutch: *Gelderland Onderneemt*), an initiative in which entrepreneurs and teachers participated in a masterclass. During the masterclass, the entrepreneurs taught the teachers about entrepreneurship, and the teachers trained the entrepreneurs in didactical skills. For further pedagogical approaches and activities that could be used in education, Lackéus (2015) offers a helpful overview of different tools, models and theories from within and outside the entrepreneurship domain. As it is beyond the scope of this thesis to elaborate here on educational pedagogies and activities, the Lackéus report (2015) is recommended for more details (see for instance p. 30, Table 6, for an overview). Lackéus also argues that EE could be approached as a means to “achieve more interest,

joy, engagement and creativity among students” (p. 18), which could be a more positive approach towards EE helping teachers to see and understand its benefits.

*The OICAT could be used to evaluate entrepreneurship programmes (with additional use of qualitative methods), and could be applied as a formative assessment in EE*

Because the narrow definition of EE is often used in practice, the success of EE programmes is commonly measured by the intentions of students to become an entrepreneur, or the number of students that have started (or will start in the near future) their own enterprise (Lackéus, 2015). However, these assessment methods do not inform us of the degree to which students have developed entrepreneurial competencies. This makes evident a need for the development of new assessment methods that do provide more information on the impact of entrepreneurship programmes, and the learning curve of students. The OICAT, as presented in Chapter 3, could be used as a formative assessment in education. The OICAT provides information on what students already can do, and what competencies need further development (please note that the OICAT needs further development for use in education, as stated in the section “6.4.3 Measuring OIC”). Furthermore, the OICAT could be used to evaluate the impact of educational entrepreneurship programmes, for instance in a pre-test/post-test design – as it was, for example, at a Dutch university of applied science for a new educational programme in entrepreneurship, with a control group based on the OICAT. The results yielded insight into students’ competence development and showed to what degree students following the new curriculum performed differently from those in the traditional programme. Additionally, the use of performance assessments (such as the OICAT) could be complemented with qualitative research designs, such as interviews, student observations, and student and/or teacher diaries (see Lackéus, 2015), in order to collect richer information on the success factors of EE.

The “entrepreneurship and education” programme of the Dutch government closed in 2013. Recently the government published the strategic agenda for higher education and research for the period 2015 to 2025 (Ministerie van Onderwijs, Cultuur en Wetenschap, 2015). Entrepreneurship is still part of the strategic agenda. Alongside attention for independent entrepreneurship, there is also emphasis on the development of an entrepreneurial attitude. The report states that the Amsterdam Centre for Entrepreneurship was given the task of developing a strategy for the further implementation of EE in higher education, together with the other centres; also, it

briefly elaborates on the fact that students should be supported in starting their own ventures – for which a pilot will be organised. Missing in the report, however, is a discussion of *how* an entrepreneurial attitude could be developed and assessed. The Amsterdam Centre for Entrepreneurship might address this point more specifically.

In conclusion, although significant steps and improvements have been reached over the years in EE, it remains a challenge to foster the development of entrepreneurial competencies in general, and more specifically of OIC, in higher education.

### 6.6.3 Policy

Although the policy level was not explicitly investigated in the current dissertation, it is considered an interesting and highly relevant level for fostering entrepreneurship in SMEs and in education in the Netherlands. Therefore, this final section provides a brief overview of what the government is doing with regard to entrepreneurship in SMEs, with specific examples. Where possible, suggestions and ideas for policy are articulated.

#### *For small and medium-sized enterprises*

Panteia conducts independent market and policy research, and supports the government by helping decision makers to formulate, monitor and evaluate strategies for policy (see [www.panteia.eu/About-Panteia](http://www.panteia.eu/About-Panteia)). Their reports are helpful for understanding the current state of entrepreneurship in SMEs. Prince and Van der Zeijden (2016) published a report in which they presented a new typology for SMEs along two dimensions: the age of the SME and its strategy. They defined four typologies: (1) independent entrepreneurs; (2) young enterprises; (3) innovative and new value-creating enterprises; and (4) regular SMEs with personnel. According to their results, the innovative enterprises were the healthiest, based on four characteristics (i.e., internal, external, strategic, and financial characteristics). In a concluding remark they state that the government stimulates the innovativeness of organisations in several ways, and that it should continue to do so. Another Panteia report (Muizer, 2015) discusses trends (including societal and economic trends) and their meaning for SMEs. Muizer (2015) classified these trends according to the typology of SMEs. His results showed that innovative enterprises highly value good entrepreneurship and being able to respond to developments in the market. Furthermore, Muizer (2015) stresses that human and knowledge-based capital is the main asset of innovative SMEs. These businesses want their employees to be satisfied

and invest in their professional development. The results illustrate the current position of (innovative) SMEs in the Netherlands.

Prince and Van der Zeijden (2015) published, on behalf of Panteia, a report on the recognition of SMEs in the government policy related to businesses. The Dutch government established its business policy in 2011 with a main goal of stimulating innovation (i.e., R&D activities) to get the Netherlands into the top five of knowledge-based economies in the world by the year 2020. In their report, Prince and Van der Zeijden (2015) discussed three regulations more specifically. In these regulations, there is clear attention for SMEs, and results showed that the regulations are being used by these companies (although the degree to which SMEs are involved depends on the project). The first regulation includes financial advantages to appointing R&D professionals. The second includes the possibility of loaning money under advantageous conditions. The third includes all kinds of activities, such as R&D collaboration projects, knowledge vouchers and networking activities, that can help (innovative) SMEs get involved in the top sectors. The top sectors are nine sectors full of opportunities in which the Dutch are internationally strong and innovative. Taken together, the Dutch government pays attention to entrepreneurship in SMEs, and acknowledges their important role in the economy.

Beyond the reports of Panteia, other policy initiatives for SMEs can be found on the website of the Dutch government (see [www.rijksoverheid.nl/onderwerpen/ondernemen-en-innovatie/inhoud/ondersteuning-voor-midden--en-kleinbedrijf-mkb](http://www.rijksoverheid.nl/onderwerpen/ondernemen-en-innovatie/inhoud/ondersteuning-voor-midden--en-kleinbedrijf-mkb)). The government offers several initiatives to support SMEs financially in entrepreneurial activities and realising innovations, for instance by offering subsidies for promising innovation plans. They also stimulate collaboration across sectors. In each top sector, for instance, organisations established consortia for knowledge and innovation in which they formulated research agendas and goals for the coming years. SMEs can approach those consortia for finances, research, and initiating collaboration with other parties. Furthermore, a project called “Small Business Innovation Research Programme” (SBIR) was started. In this programme, SMEs and multinationals from the EU are challenged to respond to tenders. The government invests in the best tenders and, eventually, uses their innovations as a solution for societal problems. In addition to these initiatives and projects (some of them temporary), entrepreneurs and SMEs can approach authorities such as the Dutch Chamber of Commerce with all kinds of questions and needs.

The initiatives discussed sound promising, and offer SMEs opportunities to act entrepreneurial and develop innovations. However, it might be difficult for SMEs to

compete with multinationals, for instance, in the SBIR programme. Multinationals might have better access to resources for responding to tenders. Recently the government opened up the SBIR programme to multinationals (it was first only open to SMEs), and must have had good reasons to do so. Still, it remains important to ensure that SMEs have good chances to compete in such programmes. Furthermore, the focus of the initiatives seems to be primarily on realising innovations, as an outcome of entrepreneurship. However, innovation is just one of the possible outcomes of entrepreneurship. More importantly, the government seems to approach innovation and entrepreneurship from an economic perspective, as something that eventually results in a concrete project or product, and that can be measured in terms of finances (e.g., profits, R&D expenditures). It could be valuable for policymakers to widen their scope and to stimulate new value-creation in general, which can lead to many profitable business outcomes. Furthermore, policy makers could apply a competence approach in their policy towards SMEs, rather than the present economic one. Policy could fulfil a valuable role in stimulating competence development in SMEs. Although competence development is more difficult to grasp in terms of hard outcomes such as profit, it is an important driver of entrepreneurial behaviour, and thus of competitiveness.

In the EU there is growing attention for lifelong learning competencies, including competencies related to entrepreneurship. As stated in Chapter 2, the EU defined “sense of initiative and entrepreneurship” as one of the key competencies for lifelong learning (European Parliament and the Council of the European Union, 2006). Since then, entrepreneurial competence has received much attention (e.g., Morselli & Ajello, 2016; Peltonen, 2015). Later, Bacigalupo, Kamylyis, Punie, and Van den Brande (2016), on behalf of the European Commission, proposed the “EntreComp”, including three competence areas and 15 competencies related to entrepreneurship. One of the three areas is “[i]deas and opportunities” (Bacigalupo et al., 2016, p. 18), including “spotting opportunities” as a related competence. The other related competencies are “creativity”, “vision”, “valuing ideas”, and “ethical and sustainable thinking” (p. 18). The authors formulated three levels of proficiency to further specify the competencies. Using OIC in such a framework could help to make the model – which can be perceived as rather complex – more specific, more closely related to a measurable competence domain, and less extensive. OIC could be fostered from a policy point of view as a specific competence domain that can be valuable in each value-creation process.

Local, independent parties could play a role in supporting SMEs in organising (entrepreneurial) and other competence development for their employees. Such parties could be the linchpin between the government and SMEs, by translating policy into practice. For instance, VAPA (see the illustrative case 6.2 on VAPA) is a study centre that supports organisations from the paper industry in the professional development of their employees. For SMEs it is often hard to set up a solid HR system due to time and resource constraints (Saru, 2007), so the help of such industry-specific parties can be very welcome. Another example is the Institute for Sustainable Process Technology (ISPT), which connects organisations in process technology and helps them in proposal writing (see the illustrative case 6.3 on ISPT). This is how ISPT aims to contribute to the innovativeness of the Dutch (process technology) industry. Both ISPT and VAPA also supported the research from the current dissertation by playing a role in the development of the OICAT, supporting the acquisition of SMEs, and contributing to the dissemination of the study results.

### **Illustrative case 6.2 VAPA**

VAPA is the study centre of the Dutch paper and cardboard industry. Its mission is to improve the performance of organisations and their employees, and to offer employees possibilities for continuous and sustainable professional development. VAPA aims to support the development of employees who work in the production process and in technical departments, both within and beyond the production process. They organise activities that contribute to better alignment between the industry and education (see [www.vapa.nl/](http://www.vapa.nl/)).

VAPA is a foundation that receives resources partly via contributions from businesses in the industry.

Organisations from the industry can approach VAPA for all kinds of learning activities: professional education, certification pathways, web-based/blended learning programmes, coaching on the job, development and implementation of learning tools, consultancy in the field of operations and HRD, and human talent programmes such as coordination of internships and graduation assignments.

Based on the needs of the sector, VAPA initiates several projects. The human talent programme, for instance, was initiated because of the growing and urgent need for new employees in the sector. The paper industries struggle with image issues, and VAPA aims to convince students of the attractiveness of the sector, as many people do not know it is a highly innovative, technical and exciting sector.

### Illustrative case 6.3 ISPT

As they describe themselves on their website (see [www.ISPT.eu](http://www.ISPT.eu)): “ISPT connects stakeholders from different sectors and disciplines to process technologies whereby process innovation is strengthened and expedited and the Netherlands distinguishes itself in the international innovation landscape”.

ISPT offers an active and open innovation platform for sustainable process technology where stakeholders can work together in a safe environment. They do so by building a trust-based network in which partners can collaborate on innovations. Their three main areas of focus are research, Europe, and education. ISPT aims to contribute to research, supports proposal writing for subsidiaries, and contributes to knowledge sharing in projects. ISPT has set up an Innovation Academy, including (1) a talent programme for students from universities of applied science, (2) Netherlands Research School in Process Technology, and (3) Open Innovation masterclasses. Through the Innovation Academy, ISPT strives to recruit and develop human capital, build a learning community, share knowledge and open innovation competencies, and educate young researchers.

#### *For education*

The Dutch government seems to acknowledge the importance of supporting an entrepreneurial mindset among pupils in education. For primary and secondary education, for instance, the government initiated the platform *Onderwijs 2032* (Education 2032; see [www.onsonderwijs2032.nl](http://www.onsonderwijs2032.nl)). This platform was established in 2015 and is aimed at redesigning education so that education prepares pupils for their future careers in a dynamic environment. The project consists of various steps. The first step, including an advisory report on the ingredients for future education, has been finalised. The many parties involved in the platform include the pupils themselves, their parents, representatives of companies, scientists and governmental parties (e.g., the Dutch *po-raad* and *vo-raad*).

The final advisory report (Onderwijs2032, 2016) stresses several times the importance of stimulating an entrepreneurial attitude. More specifically, it describes skills needed across the different disciplines. One of these skills is *creating*. Pupils must



be able to come up with innovative solutions for problems, to think outside the box, to experiment and to investigate. The platform seems to acknowledge the importance of applying a broad definition of entrepreneurship, in which new value-creation is central.

There are also other examples of initiatives to stimulate entrepreneurial thinking among pupils. In secondary education, for instance, “*entreprenasium*” was introduced (see [www.ondernemend.nu/voortgezet-onderwijs/onderwijsprogramma/entreprenasium](http://www.ondernemend.nu/voortgezet-onderwijs/onderwijsprogramma/entreprenasium)), a programme to stimulate entrepreneurial behaviour among pupils. Other initiatives can also be found on the internet. Although each project seems valuable and relevant, the relationship between the various initiatives is not always clear. Education might benefit from a clear link and overview of the different initiatives, so that schools can easily find them and use their results. It would be valuable to see where the different projects complement or overlap one another, and to have access to best practices. Furthermore, it is not always clear whether or not initiatives at certain levels of education (e.g., primary, secondary, and higher education) align with initiatives at other educational levels. For the learning progress of the pupils, it could be beneficial to align such projects by designing and implementing progression models (in Dutch: *leerlijnen*) across levels of education.

Lackéus (2015) specifically elaborates on such progression models as a solution for the different entrepreneurship projects that are being initiated in education, and the different ways in which entrepreneurship is defined and approached in these projects. Lackéus (2015) proposes a progression model that starts in primary education by discussing societal problems of interest to the pupils as an element of the core subjects of the school; it continues, for instance in secondary education, with acting upon societal problems, and eventually teaching pupils to create new value – or, if they are interested, teaching students to start their own venture. The *Onderwijs2032* platform seems to be moving in the direction of designing progression models, and it would be highly interesting to further explore the possibility of implementing progression models via this initiative.

## 6.7 Concluding remarks

Taken together, the aim of the current dissertation was to contribute to the understanding of OI by employees working for existing firms. More specifically, the main goal was to reach a better understanding of OI related to three overarching research issues: the OI process, defining OIC, and measuring OIC. The insights and contributions offer new ground for future research. Additionally, by discussing the practical implications of the results of this research, the intention was to provide ideas and inspiration for SMEs, higher education, and policymakers. By investigating the meaning of OI by employees in the context of existing firms, the results have contributed to unlocking “one of the greatest puzzles of our time, namely the creation of new value in society” (Sarasvathy, Dew, Velamuri, & Venkataraman, 2010, p. 94).

## References

- Amorós, J. E., & Bosma, N. (2014). *Global Entrepreneurship Monitor 2013 Global report*. Retrieved from <http://www.gemconsortium.org/docs/3106/gem-2013-global-report>
- Anderson, N. R., & West, M. A. (1998). Measuring climate for work group innovation: Development and validation of the team climate inventory. *Journal of Organizational Behavior, 19*, 235-258. doi:10.1002/(SICI)10991379(199805)19:3<235::AID-JOB837>3.0.CO;2-C
- Ardichvili, A., Cardozo, R., & Ray, S. (2003). A theory of entrepreneurial opportunity identification and development. *Journal of Business Venturing, 18*, 105-123. doi:10.1016/S0883-9026(01)00068-4
- Arentz, J., Sautet, F., & Storr, V. (2013). Prior knowledge and opportunity identification. *Small Business Economics, 41*, 461-478. doi:10.1007/s11187-012-9437-9
- Autor, D. H., Levy, F., & Murnane, R. J. (2003). The skill content of recent technological change: An empirical exploration. *The Quarterly Journal of Economics, 118*, 1279-1333. doi:10.3386/w8337
- Baartman, L. K. J., Bastiaens, T. J., Kirschner, P. A., & van der Vleuten, C. P. M. (2006). The wheel of competency assessment: presenting quality criteria for competency assessment programs. *Studies in Educational Evaluation, 32*, 153- 170. doi:10.1016/j.stueduc.2006.04.006
- Bacigalupo, M., Kampylis, P., Punie, Y., & van den Brande, G. (2016). *EntreComp: The entrepreneurship competence framework*. Luxembourg: Publication Office of the European Union. doi:10.2791/593884
- Bae, T. J., Qian, S., Miao, C., & Fiet, J. O. (2014). The relationship between entrepreneurship education and entrepreneurial intentions: A meta-analytic review. *Entrepreneurship Theory and Practice, 38*, 217-254. doi:10.1111/etap.12095
- Baggen, Y., Lans, H., Biemans, H. J. A., Kampen, J., & Mulder, M. (2016). Fostering entrepreneurial learning on-the-job: Evidence from innovative small and medium-sized companies in Europe. *European Journal of Education, 51*, 193-209. doi:10.1111/ejed.12171
- Baggen, Y., Mainert, J., Lans, T., Biemans, H. J. A., Greiff, S., & Mulder, M. (2015). Linking complex problem solving to opportunity identification competence within the context of entrepreneurship. *International Journal of Lifelong Education, 34*, 412-429. doi:10.1080/02601370.2015.1060029

- Baron, R. A. (2004). The cognitive perspective: A valuable tool for answering entrepreneurship's basic "why" questions. *Journal of Business Venturing, 19*, 221-239. doi:10.1016/S0883-9026(03)00008-9
- Baron, R. A., & Ensley, M. D. (2006). Opportunity recognition as the detection of meaningful patterns: Evidence of novice and experienced entrepreneurs. *Management Science, 52*, 1331-1344. doi:10.1287/mnsc.1060.0538
- Biemans, H., Wesselink, R., Gulikers, J. T. M., Schaafsma, S., Versteegen, J. A. A. M., & Mulder, M. (2009). Towards competence-based VET: Dealing with the pitfalls. *Journal of Vocational Education and Training, 61*, 267-286. doi:10.1080/13636820903194682
- Biggs, J. B. (1993). From theory to practice: A cognitive systems approach. *Higher Education Research & Development, 12*, 73-85. doi:10.1080/0729436930120107
- Billett, S. (2011). Learning Vocational practice in relative social isolation: The epistemological and pedagogic practices of small-business operators. In M. Woerkom & R. Poell (Eds.), *Supporting workplace learning* (pp. 147-162). The Netherlands: Springer.
- Binkley, M., Erstad, O., Herman, J., Raizen, S., Ripley, M., Miller-Ricci, M., & Rumble, M. (2012). Defining twenty-first century skills. In P. Griffin, B. McGaw, & E. Care (Eds.), *Assessment and teaching of 21st century skills* (pp. 17-66). Dordrecht: Springer Netherlands.
- Birenbaum, M., Breuer, K., Cascallar, E., Dochy, F., Dori, Y., Ridgway, J., . . . Nickmans, G. (2006). A learning integrated assessment system. *Educational Research Review, 1*, 61-67. doi:10.1016/j.edurev.2006.01.001
- Bosma, N., Wennekers, S., Guerrero, M., Amorós, J. E., Martiarena, A., & Singer, S. (2013). *Global Entrepreneurship Monitor: special report on Entrepreneurial Employee Activity 2011*. Retrieved from <http://www.babson.edu/executive-education/thought-leadership/premium/Documents/90246%20EEA%20Report%202011.pdf>
- Brandi, U., & Iannone, R. L. (2015). *Effective lifelong learning strategies and value creation at the enterprise level*. Thematic report, retrieved from LLLight'in'Europe website: <http://www.lllightineurope.com/publications>
- Chandler, G. N., & Jansen, E. (1992). The founder's self-assessed competence and venture performance. *Journal of Business Venturing, 7*, 223-236. doi:10.1016/0883-9026(92)90028-P
- Chowdhury, S. (2005). Demographic diversity for building an effective entrepreneurial team: Is it important? *Journal of Business Venturing, 20*, 727-746. doi:10.1016/j.jbusvent.2004.07.001

- Cohen, S. G., & Bailey, D. E. (1997). What makes teams work: Group effectiveness research from the shop floor to the executive suite. *Journal of Management*, 23, 239-290. doi:10.1177/014920639702300303
- Companys, Y. E., & McMullen, J. S. (2007). Strategic entrepreneurs at work: The nature, discovery, and exploitation of entrepreneurial opportunities. *Small Business Economics*, 28, 301-322. doi:10.1007/s11187-006-9034-x
- Cope, J. (2005). Toward a dynamic learning perspective of entrepreneurship. *Entrepreneurship Theory and Practice*, 29, 373-397. doi:10.1111/j.15406520.2005.00090.x
- Cope, J., & Watts, G. (2000). Learning by doing - an exploration of experience, critical incidents and reflection in entrepreneurial learning. *International Journal of Entrepreneurial Behaviour & Research*, 6, 104-124. doi:10.1108/13552550010346208
- Corbett, A. C. (2007). Learning asymmetries and the discovery of entrepreneurial opportunities. *Journal of Business Venturing*, 22, 97-118. doi:10.1016/j.jbusvent.2005.10.001
- Corbett, A. C., Covin, J. G., O'Connor, G. C., & Tucci, C. L. (2013). Corporate entrepreneurship: State-of-the-art research and a future research agenda. *Product Development and Management Association*, 30, 812-820. doi:10.1111/jpim.12031
- Corbett, A. C., & Hmieleski, K. M. (2007). The conflicting cognitions of corporate entrepreneurs. *Entrepreneurship Theory and Practice*, 31, 103-121. doi:10.1111/j.1540-6520.2007.00165.x
- Council of the European Union. (2011, December). *Council resolution on a renewed European agenda for adult learning* (No. 372-01). Retrieved from Official Journal of the European Union Publication website: [http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32011G1220\(01\)&from=EN](http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32011G1220(01)&from=EN)
- Curth, A. (2015). *Entrepreneurship education: a road to success. A compilation of evidence on the impact of entrepreneurship education strategies and measures*. Luxembourg: Publications Office of the European Union. doi:10.2769/408497
- Danner, D., Hagemann, D., Holt, D. V., Hager, M., Schankin, A., Wüstenberg, S., & Funke, J. (2011). Measuring performance in dynamic decision making: Reliability and validity of the tailorshop simulation. *Journal of Individual Differences*, 32, 225-233. doi:10.1027/1614-0001/a000055
- Davidsson, P. (2015). Entrepreneurial opportunities and the entrepreneurship nexus: A re-conceptualization. *Journal of Business Venturing*, 30, 674-695. doi:10.1016/j.jbusvent.2015.01.002

- de Castro, G. M., Delgado-Verde, M., Navas-López, J. E., & Cruz-González, J. (2013). The moderating role of innovation culture in the relationship between knowledge assets and product innovation. *Technological Forecasting and Social Change*, *80*, 351-363. doi:10.1016/j.techfore.2012.08.012
- Decuyper, S., Dochy, F., & van den Bossche, P. (2010). Grasping the dynamic complexity of team learning: An integrative model for effective team learning in organisations. *Educational Research Review*, *5*, 111-133. doi:10.1016/j.edurev.2010.02.002
- de Jong, P. J. (2013). The decision to exploit opportunities for innovation: A study of high-tech small-business owners. *Entrepreneurship Theory and Practice*, *37*, 281-301. doi:10.1111/j.1540-6520.2011.00459.x
- de Jong, J., & den Hartog D. (2010). Measuring innovative work behaviour. *Creativity and Innovation Management*, *19*, 23-36. doi:10.1111/j.1467-8691.2010.00547.x
- de Mol, E., Khapova, S. N., & Elfring, T. (2015). Entrepreneurial team cognition: A review. *International Journal of Management Reviews*, *17*, 232-255. doi:10.1111/ijmr.12055
- Desjardins, R., Lans, T., & Ederer, P. (2016). Editorial: Adult learning, adult skills and innovation. *European Journal of Education*, *51*, 141-154. doi:10.1111/ejed.12175
- DeTienne, D. R., & Chandler, G. N. (2004). Opportunity identification and its role in the entrepreneurial classroom: a pedagogical approach and empirical test. *Academy of Management Learning & Education*, *3*, 242-257. doi:10.5465/AMLE.2004.14242103
- Dew, N., Read, S., Sarasvathy, S. D., & Wiltbank, R. (2009). Effectual versus predictive logics in entrepreneurial decision-making: Differences between experts and novices. *Journal of Business Venturing*, *24*, 287-309. doi:10.1016/j.jbusvent.2008.02.002
- Dimov, D. (2007a). Beyond the single-person, single-insight attribution understanding entrepreneurial opportunities. *Entrepreneurship Theory and Practice*, *31*, 713-731. doi:10.1111/j.1540-6520.2007.00196.x
- Dimov, D. (2007b). From opportunity insight to opportunity intention: The importance of person-situation learning match. *Entrepreneurship Theory and Practice*, *31*, 561-583. doi:10.1111/j.1540-6520.2007.00188.x
- Dochy, F. (2009). The edumetric quality of new modes of assessment: Some issues and prospects. In G. Joughin (Eds.), *Assessment, learning and judgement in higher education* (pp. 85-114). Houten: Springer.
- Dörner, D. (1976). *Problemlösen als Informationsverarbeitung* [Problem solving as information processing]. Stuttgart: Kohlhammer.

- Dörner, D. (1986). *Diagnostik der operativen Intelligenz* [Assessment of operative intelligence]. *Diagnostica*, 32, 290-308.
- Dörner, D. (1989). *Die Logik des Misslingens. Strategisches Denken in komplexen Situationen* [Logic of failure. Strategic thinking in complex situations]. Hamburg: Rowohlt.
- Driscoll, M. P. (1999). *Psychology of learning for instruction*. Boston: Pearson Education, Inc.
- du Chatenier, E., Versteegen, J. A. A. M., Biemans, H. J. A., Mulder, M., & Omta, O. S. W. F. (2010). Identification of competencies for professionals in open innovation teams. *R&D Management*, 40, 271-280. doi:10.1111/j.1467-9310.2010.00590.x
- Dunbar, K. (1998). Problem solving. In W. Bechtel & G. Graham (Eds.). *A companion to cognitive science* (pp. 289-298). London: Blackwell.
- Dutta, D. K., & Crossan, M. M. (2005). The nature of entrepreneurial opportunities: Understanding the process using the 4I organizational learning framework. *Entrepreneurship Theory and Practice*, 29, 425-449. doi:10.1111/j.1540-6520.2005.00092.x
- Eraut, M. (2004). Informal learning in the workplace. *Studies in Continuing Education*, 26, 247-273. doi:10.1080/158037042000225245
- European Commission (2015). *User guide to the SME definition. Internal market, industry, entrepreneurship and SMEs*. doi:10.2873/620234
- European Parliament and the Council of the European Union. (2006). *Key competences for lifelong learning* (Report No. L394). Retrieved from Official Journal of the European Union website: <http://eur-lex.europa.eu/legalcontent/EN/TXT/PDF/?uri=CELEX:32006H0962&from=EN>
- Fayolle, A. (2013). Personal views on the future of entrepreneurship education. *Entrepreneurship & Regional Development*, 25, 692-701. doi:10.1080/08985626.2013.821318
- Fenwick, T. (2003). Innovation: Examining workplace learning in new enterprises. *The Journal of Workplace Learning*, 15, 123-132. doi:10.1108/13665620310468469
- Fischer, A., Greiff, S., & Funke, J. (2012). The process of solving complex problems. *The Journal of Problem Solving*, 4, 19-42. doi:10.7771/1932-6246.1118
- Fletcher, D. E. (2006). Entrepreneurial processes and the social construction of opportunity. *Entrepreneurship & Regional Development*, 18, 421-440. doi:10.1080/08985620600861105
- Foo, M., Sin, H., & Yion, L. (2006). Effects of team inputs and intrateam processes on perceptions of team viability and member satisfaction in nascent ventures. *Strategic Management Journal*, 27, 389-399. doi:10.1002/smj.514



- Frensch, P. A., & Funke, J. (1995). *Complex problem solving: the European perspective*. Hillsdale, N.J: L. Erlbaum Associates.
- Funke, J. (2001). Dynamic systems as tools for analysing human judgement. *Thinking & Reasoning*, 7, 69–89. doi:10.1080/13546780042000046
- Funke, J. (2003). *Problemlösendes Denken* [Problem solving thinking]. Stuttgart: Kohlhammer.
- Gaglio, C. M., & Katz, J. A. (2001). The psychological basis of opportunity identification: Entrepreneurial alertness. *Small Business Economics*, 16, 95–111. doi:10.1023/A:1011132102464
- Garrett, R. P., & van Holland, D. (2015). Environmental effects on the cognitions of corporate and independent entrepreneurs. *Small Business Economics*, 45, 369–381. doi:10.1007/s11187-015-9636-2
- Garud, R., & Giuliani, A. P. (2013). A narrative perspective on entrepreneurial opportunities. *Academy of Management Review*, 38, 157–160. doi:10.5465/amr.2012.0055
- George, N. M., Parida, V., Lahti, T., & Wincent, J. (2016). A systematic literature review of entrepreneurial opportunity recognition: Insights on influencing factors *International Entrepreneurship and Management Journal*, 12, 309–350. doi:10.1007/s11365-014-0347-y
- Gibb, A. (2002). Creating conducive environments for learning and entrepreneurship. Living with, dealing with, creating and enjoying uncertainty and complexity. *Industry & Higher Education*, 16, 135–148. doi:10.5367/000000002101296234
- Gibcus, P., de Kok, J., & Overweel, M. (2011). *Ondernemerschap in het hoger onderwijs. Een tussentijdse evaluatie van zes centres of entrepreneurship* [Entrepreneurship in higher education. A preliminary evaluation of six centres of entrepreneurship]. Retrieved from Panteia (governmental) website: <https://www.rvo.nl/sites/default/files/Rapport%20tussentijdse%20evaluatie%20zes%20CoE.pdf>
- Gielnik, M. M., Frese, M., Graf, J. M., & Kampschulte, A. (2011). Creativity in the opportunity identification process and the moderating effect of diversity of information. *Journal of Business Venturing*, 27, 559–576. doi:10.1016/j.jbusvent.2011.10.003
- Gigerenzer, G., & Brighton, H. (2009). Homo heuristicus: Why biased minds make better inferences. *Topics in cognitive science*, 1, 107–143. doi:10.1111/j.1756-8765.2008.01006.x
- Glaser, R. (1984). Education and Thinking. The role of knowledge. *American Psychologist*, 39, 93–104. doi:10.1037/0003-066X.39.2.93



- Grégoire, D. A., Barr, P. S., & Shepherd, D. A. (2010). Cognitive processes of opportunity recognition: The role of structural alignment. *Organization Science*, *21*, 413-431. doi:10.1287/oesc.1090.0462
- Grégoire, D. A., Corbett, A. C., & McMullen, J. S. (2011). The cognitive perspective in entrepreneurship: An agenda for future research. *Journal of Management Studies*, *48*, 1443-1477. doi:10.1111/j.1467-6486.2010.00922.x
- Grégoire, D. A., & Shepherd, D. A. (2012). Technology-market combinations and the identification of entrepreneurial opportunities: An investigation of the opportunity-individual nexus. *Academy of Management Journal*, *55*, 753-785. doi:10.5465/amj.2011.0126
- Greiff, S., Holt, D. V., & Funke, J. (2013). Perspectives on problem solving in educational assessment: Analytical, interactive, and collaborative problem solving. *Journal of Problem Solving*, *5*, 71-91. Retrieved from <http://cogprints.org/9041/>
- Greiff, S., Wüstenberg, S., & Funke, J. (2012). Dynamic problem solving: A new assessment perspective. *Applied Psychological Measurement*, *36*, 189-213. doi:10.1177/0146621612439620
- Griffin, A. (1997). PDMA research on new product development practices: Updating trends and benchmarking best practices. *Journal of Product Innovation Management*, *14*, 429-458. doi:10.1111/1540-5885.1460429.
- Gruber, M., MacMillan, I. C., & Thompson, D. T. (2012). From minds to markets: How human capital endowments shape market opportunity identification of technology start-ups. *Journal of Management*, *38*, 1421-1449. doi:10.1177/0149206310386228
- Guilford, J. P. (1967). *The nature of human intelligence*. New York: McGraw-Hill.
- Guilford, J. P. (1981). Potentiality for creativity. In J. C. Gowan, J. Khatena, & E. P. Torrance (Eds.), *Creativity: its educational implication*. Dubuque, IA: Kendall Hunt.
- Guth, W. D., & Ginsberg, A. (1990). Guest editors' introduction: Corporate entrepreneurship. *Strategic Management Journal*, *11*, 5-15. Retrieved from <http://www.jstor.org/stable/2486666>
- Hallgren, K. A. (2012). Computing inter-rater reliability for observational data: An overview and tutorial. *Tutorials in Quantitative Methods for Psychology*, *8*, 23-34. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3402032/>
- Harrison, R. T., & Leitch, C. M. (2005). Entrepreneurial learning: Researching the interface between learning and the entrepreneurial context. *Entrepreneurship Theory and Practice*, *29*, 351-371. doi:10.1111/j.1540-6520.2005.00089.x

- Hmieleski, K. M., & Ensley, M. D. (2007). A contextual examination of new venture performance: Entrepreneur leadership behavior, top management team heterogeneity, and environmental dynamism. *Journal of Organizational Behavior, 28*, 865-889. doi:10.1002/job.479
- Holman, D., Totterdell, P., Axtell, C., Stride, C., Port, R., Svensson, R., & Zibarras, L. (2012). Job design and the employee innovation process: The mediating role of learning strategies. *Journal of Business and Psychology, 27*, 177. doi:10.1007/s10869-011-9242-5
- Hornsby, J. S., Kuratko, D. F., Holt, D. T., & Wales, W. J. (2013). Assessing a measurement of organizational preparedness for corporate entrepreneurship. *Journal of Product Innovation Management, 30*, 937-955. doi:10.1111/jpim.12038
- Hornsby, J. S., Kuratko, D. F., Shepherd, D. A., & Bott, J. P. (2009). Managers' corporate entrepreneurial actions: Examining perception and position. *Journal of Business Venturing, 24*, 236-247. doi:10.1016/j.jbusvent.2008.03.002
- Hornsby, J. S., Kuratko, D. F., & Zahra, S. A. (2002). Middle managers' perception of the internal environment for corporate entrepreneurship: Assessing a measurement scale. *Journal of Business Venturing, 17*, 253-273. doi:10.1016/S0883-9026(00)00059-8
- Hsieh, C., Nickerson, J. A., & Zenger, T. R. (2007). Opportunity discovery, problem solving and a theory of the entrepreneurial firm. *Journal of Management Studies, 7*, 1255-1277. doi:10.1111/j.1467-6486.2007.00725.x
- Hülshager, U. R., Anderson, N., & Salgado, J. F. (2009). Team-level predictors of innovation at work: A comprehensive meta-analysis spanning three decades of research. *Journal of Applied Psychology, 94*, 1128-1145. doi:10.1037/a0015978
- Ireland, R. D., Covin, J. G., & Kuratko, D. F. (2009). Conceptualizing corporate entrepreneurship strategy. *Entrepreneurship Theory and Practice, 33*, 19-46. doi:10.1111/j.1540-6520.2008.00279.x
- Ireland, R. D., Hitt, M. A., Camp, M., & Sexton, D. L. (2001). Integrating entrepreneurship and strategic management actions to create firm wealth. *Academic Management Perspective, 15*, 49-63. doi:10.5465/AME.2001.4251393
- Jones, O., & Macpherson, A. (2006). Inter-organizational learning and strategic renewal in SMEs: Extending the 4I framework. *Long Range Planning, 39*, 155-175. doi:10.1016/j.lrp.2005.02.012
- Kampen, J. K., & Swyngedouw, M. (2000). The ordinal controversy revisited. *Quality & Quantity, 34*, 87-102. doi:10.1023/A:1004785723554

- Karimi, S., Biemans, H. J. A., Lans, T., Aazami, M., & Mulder, M. (2014). Fostering students' competence in identifying business opportunities in entrepreneurship education. *Innovations in Education and Teaching International*, 53, 215-229. doi:10.1080/14703297.2014.993419
- Kersting, M. (2001). Zur Konstrukt- und Kriteriumsvalidität von Problemlöseszenarien anhand der Vorhersage von Vorgesetztenurteilen über die berufliche Bewährung [About construct and predictive validity of problem solving scenarios on the basis of job performance evaluations by managers]. *Diagnostica*, 47, 67-76. doi:10.1026//0012-1924.47.2.67
- Kirzner, I. M. (1997). Entrepreneurial discovery and the competitive market process: An Austrian approach. *Journal of Economic Literature*, 35(1), 60-85. Retrieved from <http://www.jstor.org.ezproxy.library.wur.nl/stable/2729693>
- Klahr, D., & Dunbar, K. (1988). Dual space search during scientific reasoning. *Cognitive Science*, 12, 1-48. doi:10.1016/0364-0213(88)90007-9
- Klauer, K. C. (1993). *Belastung und Entlastung beim Problemlösen. Eine Theorie des deklarativen Vereinfachens* [Load and release in problem solving. A theory of declarative simplification]. Göttingen: Hogrefe.
- Klotz, A. C., Hmieleski, K. M., Bradley, B. H., & Busenitz, L. W. (2013). New venture teams: A review of the literature and roadmap for future research. *Journal of Management*, 40, 226-255. doi:10.1177/0149206313493325
- Knapp, T. R. (1990). Treating ordinal scales as interval scales: An attempt to resolve the controversy. *Nursing Research*, 39(2), 121-123. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.460.246&rep=rep1&type=pdf>
- Komarkova, I., Gagliardi, D., Conrads, J., & Collado, A. (2015). *Entrepreneurship competence: An overview of existing concepts, policies and initiatives* (Report No. EUR 27472 EN). Luxembourg: Publications Office of the European Union.
- Krueger, N. F. (2000). The cognitive infrastructure of opportunity emergence. *Entrepreneurship Theory and Practice*, 25, 5-23. doi:10.1007/978-3-540-48543-8\_9
- Krueger, N. F., Reilly, M. D., & Carsrud, A. L. (2000). Competing models of entrepreneurial intentions. *Journal of Business Venturing*, 15, 411-432. doi:10.1016/S0883-9026(98)00033-0
- Kuratko, D. F. (2005). The emergence of entrepreneurship education: Development, trends, and challenges. *Entrepreneurship Theory and Practice*, 29, 577-598. doi:10.1111/j.1540-6520.2005.00099.x

- Kyndt, E., & Baert, H. (2015). Entrepreneurial competencies: Assessment and predictive value for entrepreneurship. *Journal of Vocational Behavior, 90*, 13-25.  
doi:10.1016/j.jvb.2015.07.002
- Lackéus, M. (2015). *Entrepreneurship in education: What why, when how. Entrepreneurship360 background paper*. Retrieved from OECD website:  
[http://www.oecd.org/cfe/leed/BGP\\_Entrepreneurship-in-Education.pdf](http://www.oecd.org/cfe/leed/BGP_Entrepreneurship-in-Education.pdf)
- Lans, T., Biemans, H. J. A., & Baggen, Y. (2015). *High levels of individual and feed forward learning foster employee-driven entrepreneurship and innovativeness*. Policy brief, retrieved from LLLight'in'Europe website:  
<http://www.lllightineurope.com/policy-briefs/>
- Lans, T., Biemans, H., Verstegen, J., & Mulder, M. (2008). The influence of the work environment on entrepreneurial learning of small-business owners. *Management Learning, 39*, 597-613. doi:10.1177/1350507608098117
- Lans, T., Blok, V., & Gulikers, J. T. M. (2015). Show me your network and I'll tell you who you are: Social competence and social capital of early-stage entrepreneurs. *Entrepreneurship & Regional Development, 27*, 458-473.  
doi:10.1080/08985626.2015.1070537
- Lans, T., & Gulikers, J. T. M. (2010). Assessing entrepreneurial competence in entrepreneurship education and training. In A. Fayolle (Eds.), *Handbook of research in entrepreneurship education* (pp. 54-67). Cheltenham: Edward Elger.
- Lans, T., Hulsink, W., Baert, H., & Mulder, M. (2008). Entrepreneurship education and training in a small business context: Insights from the competence-based approach. *Journal of Enterprising Culture, 16*, 363-383.  
doi:10.1142/S0218495808000193
- Lans, T., Verstegen, J., & Mulder, M. (2011). Analysing, pursuing and networking: Towards a validated three-factor framework for entrepreneurial competence from a small firm perspective. *International Small Business Journal, 29*, 695-713.  
doi:10.1177/0266242610369737
- Lee, H., Shim, K., & Lee, H. (2016). Entrepreneurial characteristics: A systematic literature review. *Proceedings of the Pacific Asia Conference on Information Systems, Taiwan, paper 81*. ISBN:9789860491029
- Leutner, D., Wirth, J., Klieme, E., & Funke, J. (2005). Ansätze zur Operationalisierung und deren Erprobung im Feldtest zu PISA 2000. *Problemlösekompetenz von Schülerinnen und Schülern*, 21-36. Retrieved from <http://archiv.ub.uni-heidelberg.de/volltextserver/8253/>

- Lumpkin, G. T., & Dess, G. G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. *The Academy of Management Review*, 21, 135-172. doi:10.5465/AMR.1996.9602161568
- Lumpkin, G. T., & Lichtenstein, B. B. (2005). The role of organizational learning in the opportunity recognition process. *Entrepreneurship Theory and Practice*, 29, 451-472. doi:10.1111/j.1540-6520.2005.00093.x
- Man, T. W. Y., Lau, T., & Chan, K. F. (2002). The competitiveness of small and medium enterprises: A conceptualization with focus on entrepreneurial competencies. *Journal of Business Venturing*, 17, 123-142. doi:10.1016/S0883-9026(00)00058-6
- Martin, B., McNally, J. J., & Kay, M. (2013). Examining the formation of human capital in entrepreneurship: A meta-analysis of entrepreneurship education outcomes. *Journal of Business Venturing*, 28, 211-224. doi:10.1016/j.jbusvent.2012.03.002
- Mayer, R. E. (2003). *Learning and instruction*. Upper Saddle River, NJ: Prentice Hall.
- McMullen, J. S., & Shepherd, D. A. (2006). Entrepreneurial action and the role of uncertainty in the theory of the entrepreneur. *The Academy of Management Review*, 31, 132-152. doi:10.5465/AMR.2006.19379628
- Ministerie van Onderwijs, Cultuur en Wetenschap (directie Hoger Onderwijs & Studiefinanciering). (2015). *De waarde(n) van weten. Strategische agenda hoger onderwijs en onderzoek 2015-2025* [The value of knowing. Strategic agenda higher education and research 2015-2025]. Retrieved from <https://www.rijksoverheid.nl/documenten/beleidsnota-s/2015/07/07/de-waarde-n-van-weten-strategische-agenda-hoger-onderwijs-en-onderzoek-2015-2025>
- Minniti, M., & Bygrave, W. (2001). A dynamic model of entrepreneurial learning. *Entrepreneurship Theory and Practice*, 25, 5-16.
- Mitchell, R. K., Busenitz, L., Lant, T., McDougall, P. P., Morse, E. A., & Smith, J. B. (2002). Toward a theory of entrepreneurial cognition: Rethinking the people side of entrepreneurship. *Entrepreneurship Theory and Practice*, 27, 93-104. doi:10.1111/1540-8520.00001
- Mitchell, R. K., Smith, B., Seawright, K. W., & Morse, A. (2000). Cross-cultural cognitions and the venture creation decision. *The Academy of Management Journal*, 43, 974-993. doi:10.2307/1556422
- Mitchelmore, S., & Rowley, J. (2010). Entrepreneurial competencies: A literature review and development agenda. *International Journal of Entrepreneurial Behaviour & Research*, 16, 92-111. doi:10.1108/13552551011026995

- Moberg, K., Barslund Fosse, H., Hoffman, A., & Junge, M. (2014). *Impact of entrepreneurship education in Denmark – 2014*. Retrieved from <http://eng.ffe-ye.dk/media/637847/effektmac8alingen20201520eng-online.pdf>
- Morselli, D., & Ajello, A. (2016). Assessing the sense of initiative and entrepreneurship in vocational students using the European qualification framework. *Education + Training, 58*, 797-814. doi:10.1108/ET-02-2016-0038
- Muizer, A. (2015). *Trends en hun betekenis voor het MKB* [Trends and their meaning for SMEs] (report number A201446; ISBN 978-90-371-1145-3). Retrieved from Panteia (governmental) website: <https://ondernemerschap.panteia.nl>
- Mulder, M. (2014). Conceptions of professional competence. In S. Billett, C. Harteis & H. Gruber (Eds.), *International handbook on research into professional and practice-based learning* (pp. 107-137). Dordrecht: Springer.
- Mulder, M. (2017). *Competence-based vocational and professional education. Bridging the worlds of work and education*. Cham: Springer International Publishing Switzerland.
- Mulder, M., Lans, T., Verstegen, J., Biemans, H., & Meijer, Y. (2007). Competence development of entrepreneurs in innovative horticulture. *The Journal of Workplace Learning, 19*, 32-44. doi:10.1108/13665620710719330
- Muller, P., Gagliardi, D., Caliandro, C., Bohn, N. U., & Klitou, D. (2014). *Annual report on European SMEs 2013/2014. A partial and fragile recovery*. Retrieved from [http://ec.europa.eu/growth/smes/business-friendly-environment/performance-review/files/supporting-documents/2014/annual-report-smes-2014\\_en.pdf](http://ec.europa.eu/growth/smes/business-friendly-environment/performance-review/files/supporting-documents/2014/annual-report-smes-2014_en.pdf)
- Nason, R. S., McKelvie, A., & Lumpkin, G. T. (2015). The role of organizational size in the heterogeneous nature of corporate entrepreneurship. *Small Business Economics, 45*, 279-304. doi:10.1007/s11187-015-9632-6
- Newell, A., & Simon, H. A. (1972). *Human problem solving*. Englewood Cliffs, NJ: Prentice-Hall
- Nickerson, J. A., & Zenger, T. R. (2004). A knowledge-based theory of the firm – the problem solving perspective. *Organization Science, 15*, 617-632. doi:10.1287/orsc.1040.0093
- Novick, L. R., & Bassok, M. (2005). Problem solving. In K. J. Holyoak & R. G. Morrison (Eds.), *The Cambridge handbook of thinking and reasoning*. New York: Cambridge University Press.
- OECD. (2010). *PISA 2012 field trial problem solving framework*. Retrieved from <http://www.oecd.org/pisa/pisaproducts/46962005.pdf>

- Ohlsson, S. (1992). Information-processing explanations of insight and related phenomena. In M. Keane & K. Gilhooly (Eds.), *Advances in the psychology of thinking*. London: Harvester Wheatsheaf.
- Olsen, D. S. (2016). Adult learning in innovative organisations. *European Journal of Education, 51*, 210-226. doi:10.1111/ejed.12170
- Onderwijs2032. (2016). *Ons onderwijs2032. Eindadvies* [Our education2013. Final recommendation]. Pijnacker: Impressed Druk.
- Osterwalder, A., & Pigneur, Y. (2010). *Business model generation: A handbook for visionaries, game changes, and challengers*. New York: Wiley.
- Ozgen, E., & Baron, R. A. (2007). Social sources of information in opportunity recognition: effects of mentors, industry networks, and professional forums. *Journal of Business Venturing, 22*, 174-192. doi:10.1016/j.jbusvent.2005.12.001
- Pannekoek, L., van Kooten, O., Kemp, R., & Omta, S. W. F. (2005). Entrepreneurial innovation in chains and networks in Dutch greenhouse horticulture. *Journal on Chain and Network Science, 5*, 39-50. doi:10.3920/JCNS2005.x053
- Peltonen, K. (2015). How can teachers' entrepreneurial competences be developed? A collaborative learning perspective. *Education + Training, 57*, 492-511. doi:10.1108/ET-03-2014-0033
- Politis, D. (2005). The process of entrepreneurial learning: a conceptual framework. *Entrepreneurship Theory and Practice, 29*, 399-424. doi:10.1111/j.1540-6520.2005.00091.x
- Prince, Y., & van der Zeijden, P. (2015). *Aandacht voor het MKB in het bedrijvenbeleid* [Attention for SMEs in the policy on companies] (report number A201438; ISBN 978-90-371-1140-8). Retrieved from Panteia (governmental) website: <https://ondernemerschap.panteia.nl>
- Prince, Y., & van der Zeijden, P. (2016). *De gezondheid van vier MKB-typen in 2015* [The health of four types of SMEs in 2015] (report number A201448; ISBN 978-90-371-1146-0). Retrieved from Panteia (governmental) website: <https://ondernemerschap.panteia.nl>
- Punj, G., & Stewart, D. W. (1983). Cluster analysis in marketing research: Review and suggestions for application author(s). *Journal of Marketing Research, 20*(2), 134-148. Retrieved from <http://www.jstor.org/stable/3151680>
- Rae, D. (2006). Entrepreneurial learning: A conceptual framework for technology-based enterprise. *Technology Analysis & Strategic Management, 18*, 39-56. doi:10.1080/09537320500520494

- Rapelli, S. (2012). *European i-pros: a study*. Retrieved from European Forum of Independent Professionals website: <http://www.efip.org/?s=european+i-pros%3A+a+study>
- Rauch, A., & Frese, M. (2007a). Born to be an entrepreneur? Revisiting the personality approach to entrepreneurship. In J. R. Baum, M. Frese, & R. A. Baron (Eds.), *The psychology of entrepreneurship* (pp. 41-65). New Jersey: Lawrence Erlbaum.
- Rauch, A., & Frese, M. (2007b). Let's put the person back into entrepreneurship research: A meta-analysis on the relationship between business owners' personality traits, business creation, and success. *European Journal of Work and Organizational Psychology*, 16, 353-385. doi:10.1080/13594320701595438
- Reid, S. E., & De Brentani, U. (2004). The fuzzy front end of new product development for discontinuous innovations: A theoretical model. *Journal of Product Innovation Management*, 21, 170-184. doi:10.1111/j.0737-6782.2004.00068.x
- Renko, M., Shrader, R. C., & Simon, M. (2012). Perception of entrepreneurial opportunity: A general framework. *Management Decision*, 50, 1233-1251. doi:10.1108/00251741211246987
- Rideout, E. C., & Gray, D. O. (2013). Does entrepreneurship education really work? A review and methodological critique of the empirical literature on the effects of university-based entrepreneurship education. *Journal of Small Business Management*, 51, 329-351. doi:10.1111/jsbm.12021
- Rigtering, J. P. C., & Weitzel, U. (2013). Work context and employee behaviour as antecedents for intrapreneurship. *International Entrepreneurship and Management Journal*, 9, 337-360. doi:10.1007/s11365-013-0258-3
- Salvi, C., Bricolo, E., Kuonios, J., Bowden, E., & Beeman, M. (2016). Insight solutions are correct more often than analytical solutions. *Thinking and Reasoning*, 22, 443-460. doi:10.1080/13546783.2016.1141798
- Santos, S. C., Caetano, A., Baron, R., & Curral, L. (2015). Prototype models of opportunity recognition and the decision to launch a new venture. Identifying the basic dimensions. *International Journal of Entrepreneurial Behavior & Research*, 21, 510-538. doi:10.1108/IJEER-04-2014-0058
- Sarasvathy, S. D., Dew, N., Velamuri, S. R., & Venkataraman, S. (2010). Three views of entrepreneurial opportunity. In Z. J. Acs & D. B. Audretsch (Eds.), *Handbook of entrepreneurship research*. Boston: Springer.
- Saru, E. (2007). Organisational learning and HRD: How appropriate are they for small firms? *Journal of European Industrial Training*, 31, 36-51. doi:10.1108/03090590710721727



- Shane, S. (2000). Prior knowledge and the discovery of entrepreneurial opportunities. *Organization Science*, 11, 448-469. doi:10.1287/orsc.11.4.448.14602
- Shane, S., & Nicolaou, N. (2015). Creative personality, opportunity recognition and the tendency to start businesses: A study of their genetic predispositions. *Journal of Business Venturing*, 30, 407-419. doi:10.1016/j.jbusvent.2014.04.001
- Shane, S., & Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. *The Academy of Management Review*, 25, 271-226. doi:10.5465/AMR.2000.2791611
- Sharma, P., & Chrisman, S. J. J. (2007). Toward a reconciliation of the definitional issues in the field of corporate entrepreneurship. In A. Cuervo, D. Ribeiro, & S. Roig (Eds.), *Entrepreneurship: concepts, theory and perspective* (pp. 83-103). Berlin: Springer.
- Shepherd, D. A., & DeTienne, D. R. (2005). Prior knowledge, potential financial reward, and opportunity identification. *Entrepreneurship Theory and Practice*, 29, 91-112. doi:10.1111/j.1540-6520.2005.00071.x
- Shepherd, D. A., & Krueger, N. F. (2002). An intentions-based model of entrepreneurial teams' social cognition. *Entrepreneurship Theory and Practice*, 167-185. doi:10.1111/1540-8520.00005
- Spector, P. E. (1992). *Summated rating scale construction: An introduction*. California: SAGE Publications, Inc.
- Stevens, G. A., & Burley, J. (2003). Piloting the rocket of radical innovation. *Research Technology Management*, 46 (2), 16-25.
- Stevenson, H. H., & Jarillo, J. C. (1990). A paradigm of entrepreneurship: Entrepreneurial management. *Strategic Management Journal*, 11, 17-27. doi:10.1007/978-3-540-48543-8\_7
- Støren, L. A. (2016). Factors that promote innovativeness and being an innovative learner at work – Results from PIAAC. *European Journal of Education*, 51, 176-192. doi:10.1111/ejed.12173
- Suddaby, R., Bruton, G. D., & Si, S. X. (2015). Entrepreneurship through a qualitative lens: Insights on the construction and/or discovery of entrepreneurial learning. *Journal of Business Venturing*, 30, 1-10. doi:10.1016/j.jbusvent.2014.09.003
- Tierney, P., & Farmer, S. M. (2011). Creative self-efficacy development and creative performance over time. *Journal of Applied Psychology*, 96, 277-293. doi:10.1037/a0020952
- Toner, P. (2011). *Workforce skills and innovation: An overview of major themes in the literature*. Retrieved from OECD Directorate for Science, Technology and Industry

- (STI), and Centre for Educational Research and Innovation (CERI) website: [http://www.oecd-ilibrary.org/science-and-technology/workforce-skills-and-innovation\\_5kgkdgdgc8tl-en](http://www.oecd-ilibrary.org/science-and-technology/workforce-skills-and-innovation_5kgkdgdgc8tl-en)
- Tynjälä, P. (2013). Toward a 3-P model of workplace learning: a literature review. *Vocations and Learning*, 6, 11-36. doi:10.1007/s12186-012-9091-z
- Ucbasaran, D., Westhead, P., & Wright, M. (2009). The extent and nature of opportunity identification by experienced entrepreneurs. *Journal of Business Venturing*, 24, 99-115. doi:10.1016/j.jbusvent.2008.01.008
- Venkataraman, S., Sarasvathy, S. D., Dew, N., & Forster, W. R. (2012). Reflections on the 2010 AMR decade award: Whither the promise? Moving forward with entrepreneurship as a science of the artificial. *Academy of Management Review*, 37, 21-33. doi:10.5465/amr.2011.0079
- Vogel, P. (2016). From venture idea to venture opportunity. *Entrepreneurship Theory and Practice*. Advance online publication. doi:10.1111/etap.12234
- VSNU-NOA. (2016). *Competentie-instrument voor de Nederlandse universiteiten*. [Competency-instrument for the Dutch universities]. Retrieved from VSNU website: [http://www.vsnunl/files/documenten/CAO/Competentie\\_Instrument\\_VSNU\\_20101201.pdf](http://www.vsnunl/files/documenten/CAO/Competentie_Instrument_VSNU_20101201.pdf)
- Vyakarnam, S., & Handelberg, J. (2005). Four themes of the impact of management teams on organizational performance. Implications for future research of entrepreneurial teams. *International Small Business Journal*, 23, 236-256. doi:10.1177/0266242605052072
- Wang, L. W., & Chugh, H. (2014). Entrepreneurial learning: Past research and future challenges. *The International Journal of Management Reviews*, 16, 24-61. doi:10.1111/ijmr.12007
- Wang, Y. L., Ellinger, A. D., & Wu, Y. C. J. (2013). Entrepreneurial opportunity recognition: An empirical study of R&D personnel. *Management Decision*, 51, 248-266. doi:10.1108/00251741311301803
- Ward, T. B. (2004). Cognition, creativity, and entrepreneurship. *Journal of Business Venturing*, 19, 173-188. doi:10.1016/S0883-9026(03)00005-3.
- Warr, P., & Bunce, D. (1995). Trainee characteristics and the outcomes of open learning. *Personnel Psychology*, 48, 347-375. doi:10.1111/j.1744-6570.1995.tb01761.x
- West, G. P. (2007). Collective cognition: When entrepreneurial teams, not individuals, make decisions. *Entrepreneurship Theory and Practice*, 31, 77-102. doi:10.1111/j.1540-6520.2007.00164.x

- Wood, M. S., & McKelvie, A. (2015). Opportunity evaluation as future focused cognition: Identifying conceptual themes and empirical trends. *International Journal of Management Reviews*, 17, 256-277. doi:10.1111/ijmr.12053
- Wood, M. S., & McKinley, W. (2010). The production of entrepreneurial opportunity: A constructivist perspective. *Strategic Entrepreneurship Journal*, 4, 66-84. doi:10.1002/sej.83
- Wüstenberg, S., Greiff, S., & Funke, J. (2012). Complex problem solving – more than reasoning? *Intelligence*, 40, 1-14. doi:10.1016/j.intell.2011.11.003



## English summary

### Opportunity identification by employees

Opportunities and their identification are of significant importance for competitiveness in today's complex and turbulent business environment because they serve as a key influencing factor for new value-creation. Opportunity identification (OI) is interesting not only from the perspective of new business start-ups, but also from the perspective of employees in existing organisations. Each entrepreneurial process starts with an imagined, rudimentary idea in the mind of an individual. The further exploration and development of such opportunities by employees can lead to the realisation of all kinds of corporate entrepreneurship outcomes, such as innovation, strategic renewal, and internal or external venturing.

This dissertation reports on the capability of employees to identify opportunities, referred to as opportunity identification competence (OIC). Here, OIC is both conceptually mapped and empirically explored. A performance instrument to measure OIC is developed and tested in higher education. As well, 12 businesses, including 234 employees in 51 teams, participated in this research project. Most companies were in the category known as small and medium-sized enterprise (SME). The participating companies have in common that they felt an urgent need for entrepreneurship as a driver of competitiveness. Furthermore, they aimed to commit and stimulate their employees to contribute to the entrepreneurial process, without having formal mechanisms or structures for doing so.

### Problem statement

Although the importance of OI has been recognised from both theoretical and practical points of view, research on OI is still young. Many empirical and conceptual studies lack a clear definition of opportunities, and it is not always evident which part of the OI process is being investigated. As a result, comparing studies is complicated and theory on OI remains fragmented. The main aim of the current dissertation was thus to contribute to the understanding of OI in relation to three overarching research issues: (1) the OI process, (2) defining OIC, and (3) measuring OIC.

The first research issue relates to *defining the OI process*. What opportunities are, and how they come into being, is a topic of lively discussion in the literature. Some scholars argue that opportunities exist in the economic environment, waiting to be discovered. Others argue that opportunities are subjective entities, socially constructed, and created by individuals. The position scholars choose has an impact on how

opportunities and the process behind their identification are defined and investigated. Because using the term “opportunity” without defining it can be misleading, it is problematic that not all authors define OI. Furthermore, opportunities can be identified by teams as well as by individuals. New ventures are often created by teams; as well, in existing firms, innovations are often developed and realised by teams. However, though the literature offers some insight into OI in existing firms at the individual level, only few researchers have investigated OI at the team level.

The second research issue relates to *defining OIC*: the capability of employees to identify opportunities. OIC is investigated in the current thesis from a competence theory perspective. Two main characteristics of competencies are that (1) a competence is something people can learn, and (2) a competence is always connected to a certain context. Consequently, insight into the influence of contextual factors on OIC, referred to as antecedents, can help to get a better grasp on *explaining* individual’s OIC in its context. However, empirical work on which antecedents play a significant role in OIC in the context of existing companies is still scarce.

The third research issue relates to *measuring OIC*. In several studies, OIC was measured using different instruments, such as self-assessments and interviews in which participants had to list previously observed opportunities. Although these studies contributed significantly to understanding OIC, several authors argued that such measures might not fully capture OIC. Interviews and self-assessments measure perceptions, feelings, and impressions, instead of actual behaviour. Consequently, these authors suggest measuring the actual thinking or behaviour of employees, and they call for the development of performance tests to assess OIC.

To sum up, the goal of this thesis was to contribute to the understanding of OI in relation to the three overarching research issues mentioned above. The central research question of this dissertation was: *What characterises opportunity identification by employees on the individual and team level?* In order to answer this central research question, the following five research sub-questions have been formulated:

1. What is OIC?
2. What is a suitable instrument for assessing OIC?
3. What are antecedents of individual OIC (as an outcome of entrepreneurial learning) in a small and medium-sized business context?
4. To what degree do individual employees and teams have different cognitive OI frameworks for identifying business opportunities?

5. To what extent do the cognitive OI frameworks of individual employees and teams correspond with the cognitive OI framework of an experienced, independent entrepreneur?

The next section elaborates on these research sub-questions, their relationship with the chapters, and the corresponding results.

### **Content and main findings**

Following the introduction of the research project in Chapter 1, Chapter 2 discusses the research sub-question “*What is OIC?*” This chapter begins with elaboration on the research roots, process model, and measurement of OIC through literature study. In the discussion of the objective and the subjective views on opportunities, it is concluded that these views are not mutually exclusive. Therefore, inputs from both the objective and subjective views were used in the present studies. Then the work of Wood and McKinley (2010) assisted in gaining insight into the complexity of the process fundamental to OI. In their conceptual model they include the influencing role of both environmental and relational factors in OI. Wood and McKinley (2010) described the opportunity production process as *opportunity objectification* and *opportunity enactment*. In the current study, OI was considered part of opportunity objectification, in which an individual has an imagined, rudimentary idea; in this very early stage, it is uncertain whether or not the idea could be a real opportunity. In order to reduce uncertainty, the individual shares the idea with friends and family: with trusted others. This results in a process in which the idea is further refined, improved, changed, and acted upon. Eventually, the idea objectifies into an opportunity acknowledged by others (or, sometimes, the idea is abandoned). Accordingly, individual OIC was defined as: “The ability of individuals to identify ideas for new products, processes, practices or services in response to a particular pain, problem or new market need” (Baggen et al., 2015, p. 417). Then a discussion of existing instruments for measuring OIC led to the conclusion that these instruments might not fully capture the actual thinking and behaviour of people, but rather measure perceptions (i.e., self-perceived OIC). Consequently, several authors suggest measuring the actual thinking or behaviour of employees, and they call for the development of performance tests to assess OIC.

Accordingly, Chapter 3 contains an investigation of the research sub-question “*What is a suitable instrument for assessing OIC?*” A performance assessment, referred to as the opportunity identification competence assessment test (OICAT), was developed and tested among 115 Dutch master’s students and 142 Portuguese bachelor’s students. Higher education was considered a suitable setting to test the OICAT before applying it

among employees. The OICAT consisted of two tasks: Task 1, business idea generation, and Task 2, business idea evaluation. The development of Task 1 was informed by the literature on creativity. In Task 1, participants were asked to generate, within ten minutes, as many ideas as possible based on a case about sustainable development. The development of Task 2 was informed by the literature on cognition, and more specifically the literature on the differences between novice and expert cognitive frameworks based on the work of Baron and Ensley (2006). Cognitive frameworks function as a template, and help in recognising meaningful patterns and links between apparently independent events and information. In Task 2, 10 arguments were presented to the participants: five arguments derived from the framework of the novice entrepreneur, and five from the framework of the experienced entrepreneur. The participants were asked to select, within five minutes, the five arguments they considered most important when evaluating business ideas' potential success. The results of this empirical study showed that the OICAT can be used to track individual differences in OIC. Furthermore, there was no significant correlation between the two tasks; this indicates that the OI process consists of different sub-stages requiring people with different competencies. After conceptually mapping (Chapter 2) and operationalising (Chapter 3) OIC, the OIC of employees was further investigated in existing firms.

Chapter 4 explored which antecedents influence the OIC of individual employees. A helpful angle for investigating individual level antecedents is to look at the learning aspect in entrepreneurship. Authors particularly refer to OIC as an important outcome of entrepreneurial learning. Accordingly, the research sub-question of this chapter was, *"What are antecedents of individual OIC (as an outcome of entrepreneurial learning) in a small and medium-sized business context?"* The 3-P model (i.e., presage, process, and product) of Tynjälä (2013) was used to further explore what antecedents influence individuals' OIC. Presage factors relate to the learner and work environment, and process relates to the actual involvement in entrepreneurial activities. Based on the literature on independent entrepreneurship and organisational learning, presage and process factors were identified that could influence OIC (i.e., the product in the model). In total, 234 employees from 12 existing firms participated in this study; survey data were collected and analysed. The firms were mainly active in the agricultural, food, and paper industry. OIC was the outcome variable in the tested model, and operationalised as the number of ideas of the individual employee adopted by the management in the last three years. The results showed that self-perceived creative self-efficacy and Entrepreneurial Employee Activity (the actual involvement in entrepreneurial



activities; i.e., the process) positively influenced individuals' OIC. Work environment factors were only indirectly related to individuals' OIC.

In Chapter 5, the team level was included in the analysis. Here OI was investigated from the perspective of the cognitive literature that was also used in Chapter 3 for developing OICAT Task 2. The aim of this chapter was to explore the cognitive frameworks of individual employees and teams for OI. This chapter contains discussion of two research sub-questions: (1) *“To what degree do individual employees and teams have different cognitive OI frameworks for identifying business opportunities?”* And (2) *“To what extent do the cognitive OI frameworks of individual employees and teams correspond with the cognitive OI framework of an experienced, independent entrepreneur?”* The expert framework of independent entrepreneurs, derived from the literature, was used as a starting point for interpreting the differences between individual and team OI. This expert framework can be considered to be of good quality, as it has been refined, questioned, and sharpened over years of experience. Data were collected among the same participants as described in Chapter 4. The participants worked on OICAT Task 2 individually and in a randomly assigned team of four or five persons. The main lesson learned from this study was that individuals and teams used different cognitive frameworks for identifying business opportunities. More importantly, the results suggest that the cognitive OI framework of the teams was more similar to the cognitive OI framework of experienced, independent entrepreneurs. The results thus suggest that team participation is valuable from the very start of the entrepreneurial process.

### **Theoretical implications**

Chapter 6 discusses the results of this thesis in the light of the three overarching research issues as presented in Chapter 1 (and the problem statement in this summary). To reflect on the first research issue regarding *the OI process*, the framework of Vogel (2016) is used as a starting point for framing how the results and instruments of this thesis can be understood and positioned in the opportunity process. The results of the current dissertation contribute to the framework of Vogel (2016) by adding business idea evaluation to the opportunity process, making the process more specific. Furthermore, the measurements used in this dissertation are related to the framework of Vogel (2016), contributing to understanding how the different stages of the entrepreneurial process can be measured.

Regarding the second research issue, *defining OIC*, two characteristic elements of competence theory are reflected upon: (1) learnability of competencies and (2) context-specificity of competencies. First of all, the results of this dissertation suggest that

employees learn by doing, and also tentatively suggest that employees can learn to identify opportunities (by participating in entrepreneurial activities). Although it is not possible to conclude without a doubt, based on the results of this thesis, whether individuals can develop OIC, these results and the results of earlier studies lend credence to the notion that individuals can learn to identify opportunities. Secondly, OIC is considered relevant for all workers, though there can be OIC differences between production workers who might need less developed OIC, and managers, R&D professionals, and temporary (agency) workers who might need better developed OIC. Both the expectations and goals of the employer and the personal goals and desires of the employee determine to what degree employees should have OIC.

Regarding the third research issue, *measuring OIC*, the OICAT proved to be applicable among a wide range of participants (i.e., students and employees working for different businesses), it generated useful results for research, and it was positively evaluated in practice. From an educational perspective, the OICAT aligns with the development from “assessment of learning” towards “assessment for learning”, meaning that assessment is not only used to determine whether or not individual learners are successful, but also to provide rich and constructive feedback to learners about their competence development.

Subsequently, Chapter 6 elaborates on several limitations of this thesis and suggestions for future research.

### **Practical implications**

In Chapter 6, practical implications are discussed on the levels of SME, higher education, and policy. The main goal of this section is to open up the discussion on the meaning of entrepreneurship, and specifically of OI in practice, and to provide guidelines and ideas for how entrepreneurship could be further implemented as a valuable human capital asset for society. A broad definition of entrepreneurship is advocated: one in which entrepreneurship is considered important for everyday (working) life and has new value-creation as a core goal. In such an approach, OIC can function as a specific, measurable, and learnable competence domain which is part of each entrepreneurial process.

## Conclusion

In light of the central research question of this dissertation, *What characterises opportunity identification by employees on the individual and team level?*, the results suggest that OI deserves attention in existing businesses, both as a meaningful process leading towards new value-creation and as a relevant capability of employees. OIC is a multi-phased phenomenon consisting of two main competencies, namely business idea generation and business idea evaluation. Employees can have one of the competencies (business idea generation or business idea evaluation) to a greater extent, or both of them. Organisations need employees that are able to generate business ideas and employees that are able to evaluate the potential success of business ideas. The results of this thesis suggest that, just like independent entrepreneurs, employees mainly acquire such competencies by a process of learning by doing; this means that employees should become involved in entrepreneurial activities on the shop floor. Creating teams can be a solution, bringing together the competencies needed for the successful identification of opportunities. Moreover, the results suggest that the commitment of teams in the early stages of the entrepreneurial process is highly relevant, because the team cognitive framework for identifying opportunities seems more effective than the individual cognitive framework.

Taken together, at the defining, initial stage of the entrepreneurial process opportunities are identified by individuals or, preferably, by teams – in a process by which business ideas are generated and evaluated for their potential success. When studying opportunities and their identification, scholars should take into account the differences in OIC between SMEs, employees, and even within OIC itself (i.e., between business idea generation and business idea evaluation). In practice as well, these differences should be considered in the selection and management of employees, in assessing OIC and in composing teams, because teams need both business idea generators and business idea evaluators.



## Nederlandse samenvatting

### Identificatie van kansen door werknemers

In de huidige complexe en turbulente bedrijfsomgeving is het voor de concurrentiepositie van bedrijven van cruciaal belang om te ondernemen en daarmee om kansen te identificeren. Kansen zijn namelijk bepalend voor de creatie van nieuwe waarde. Kansensidentificatie (KI, in het proefschrift “opportunity identification”, afgekort als OI) is dan ook niet alleen interessant vanuit het perspectief van nieuwe ondernemingen, maar ook vanuit het perspectief van werknemers die voor bestaande bedrijven werken. Elk ondernemerschapsproces start met een voorstelling van een (nog) ruw idee, in de gedachten van een individu. De verdere ontwikkeling van zulke ideeën door werknemers kan leiden tot het realiseren van allerlei ondernemerschapsuitkomsten, zoals innovatie, strategische vernieuwing en het starten van nieuwe afdelingen (binnen en buiten het bestaande bedrijf).

Dit proefschrift gaat in op het vermogen van werknemers om kansen te identificeren, ook wel *kansensidentificatie competentie* genoemd (KIC, in het proefschrift “opportunity identification competence”, afgekort als OIC). KIC is in dit proefschrift zowel conceptueel als empirisch onderzocht. Er is een gedragstest ontwikkeld om KIC te meten en deze is in het hoger onderwijs getest. Daarnaast hebben 234 werknemers, onderverdeeld naar 51 teams van 12 bedrijven aan dit onderzoeksproject meegedaan. De meeste bedrijven vielen in de categorie midden- en kleinbedrijf (MKB). De gemeenschappelijke deler van de bedrijven die hebben meegedaan aan dit onderzoeksproject is dat zij allemaal een urgente behoefte voelen om ondernemerschap in te zetten als een belangrijk middel voor het behalen van concurrentievoordeel. Daarnaast streven zij er allemaal naar hun werknemers te stimuleren om bij te dragen aan het ondernemerschapsproces, zonder dat zij over formele systemen of structuren beschikken om dat te doen.

### Probleemstelling

Ondanks dat het belang van KI wordt erkend in de theorie en de praktijk, is onderzoek naar KI nog steeds vrij nieuw. In veel empirische en conceptuele onderzoeken ontbreekt een duidelijke definitie van wat kansen zijn, en het is niet altijd duidelijk welk gedeelte van het KI proces wordt onderzocht. Hierdoor is het moeilijk om verschillende onderzoeken te vergelijken en blijft de theorie over KI gefragmenteerd. Het belangrijkste doel van dit proefschrift is om bij te dragen aan het begrip van KI in

relatie tot drie overkoepelende onderzoekskwesties: (1) het KI proces, (2) het definiëren van KI, en (3) het meten van KIC.

De eerste onderzoekskwestie gaat over *het definiëren van het KI proces*. Wat zijn kansen? En hoe ontstaan kansen? Deze vragen zijn onderwerp van een levendige discussie in de literatuur. Sommige onderzoekers beargumenteren dat er altijd kansen zijn, onopgemerkt, totdat zij door iemand worden ontdekt (objectieve visie). Andere onderzoekers beargumenteren dat kansen subjectief zijn, dat zij sociaal worden geconstrueerd en gecreëerd door individuen (subjectieve visie). De positie die onderzoekers in deze discussie innemen, heeft gevolgen voor hoe kansen en het proces achter de identificatie van kansen worden gedefinieerd en bestudeerd. Om deze reden is het van cruciaal belang dat onderzoekers definiëren hoe zij KI benaderen. Helaas wordt dat tot op heden niet altijd gedaan. Daarnaast kunnen kansen zowel door individuen als teams worden geïdentificeerd. Nieuwe ondernemingen worden namelijk vaak gecreëerd door teams. Ook in het bedrijfsleven worden innovaties vaak ontwikkeld en geïmplementeerd door teams. In de literatuur is tot nu toe in redelijke mate aandacht besteed aan KI in het bedrijfsleven op het individuele niveau, maar nauwelijks op teamniveau.

De tweede onderzoekskwestie gaat over *het definiëren van KIC*: het vermogen van werknemers om kansen te identificeren. In dit proefschrift is KIC onderzocht vanuit het perspectief van competentietheorie. Twee belangrijke kenmerken van competenties zijn (1) dat mensen competenties kunnen ontwikkelen en (2) dat een competentie altijd is verbonden aan een bepaalde context. Inzicht in de invloed van contextfactoren (ook wel: antecedenten) op KIC kan daarom helpen om meer grip te krijgen op KIC van individuen in een bepaalde context. Empirisch onderzoek naar de antecedenten die een rol spelen in KIC in bestaande bedrijven is tot nu toe zeldzaam.

De derde onderzoekskwestie gaat over *het meten van KIC*. KIC is in verschillende studies gemeten met behulp van verschillende instrumenten, zoals zelfbeoordelingen en interviews waarin respondenten werden gevraagd om eerder geobserveerde kansen op te noemen. Hoewel dergelijke studies hebben bijgedragen aan ons begrip van KIC, blijft het volgens verschillende onderzoekers twijfelachtig of zulke instrumenten daadwerkelijk KIC meten. Interviews en zelfbeoordelingen meten percepties, gevoelens, en indrukken, in plaats van daadwerkelijk gedrag. Om deze reden suggereren verschillende onderzoekers om inzicht te geven in de gedachten of het gedrag van werknemers, en om een gedragstest te ontwikkelen om KIC te meten.

Samenvattend: het doel van deze dissertatie was om bij te dragen aan het begrip van KI in relatie tot de drie bovengenoemde onderzoekskwesties. De centrale

onderzoeksvraag van dit proefschrift was: *Wat kenmerkt kansidentificatie door werknemers op het individuele en teamniveau?* Om deze centrale vraag te beantwoorden, zijn vijf deelvragen geformuleerd:

1. Wat is KIC?
2. Wat is een geschikt instrument voor het meten van KIC?
3. Wat zijn antecedenten van KIC (als uitkomst van ondernemend leren) van individuen in het MKB?
4. In welke mate verschillen de cognitieve KI raamwerken van individuele werknemers en teams?
5. In welke mate matchen de cognitieve KI raamwerken van individuele werknemers en teams met het cognitieve KI raamwerk van een ervaren, onafhankelijke ondernemer?

In de volgende sectie worden de deelvragen, hun relatie met de hoofdstukken, en de bijbehorende resultaten besproken.

### **Belangrijkste bevindingen**

Na een introductie in Hoofdstuk 1, volgt Hoofdstuk 2 waarin de deelvraag “*Wat is KIC?*” wordt behandeld. Aan het begin van dit hoofdstuk wordt eerder onderzoek naar KI, het KI proces en het meten van KIC besproken, middels een literatuurstudie. Op basis van de discussie over de objectieve en subjectieve visie op kansen, wordt geconcludeerd dat de visies elkaar niet uitsluiten. Om deze reden is input vanuit zowel de objectieve als de subjectieve visie gebruikt in de studies in deze dissertatie. Vervolgens wordt het werk van Wood en McKinley (2010) gebruikt om meer inzicht te krijgen in de complexiteit van het proces dat ten grondslag ligt aan KI. In hun conceptuele model bespreken Wood en McKinley (2010) zowel de rol van de omgeving als relationele factoren in KI. Zij omschrijven het KI proces als *kansenobjectivering* en *kansenuitvoering*. In dit proefschrift wordt KIC gezien als een onderdeel van kansensubjectivering, waarin een individu in gedachten een voorstelling heeft van een (nog) ruw idee. Het is in dit vroege stadium nog niet zeker of het idee daadwerkelijk een kans zou kunnen zijn. Om de onzekerheid over het idee te verminderen, deelt het individu het idee met vrienden en familie: mensen die hij of zij vertrouwt. Dit resulteert in een proces waarin het idee verder wordt verfijnd, verbeterd, veranderd, en besproken. Als het idee uiteindelijk wordt erkend door anderen krijgt het een zeker bestaansrecht, wat resulteert in de “objectivering” van het idee: het is een kans met potentie. In lijn met het conceptuele model van Wood en McKinley en de objectieve en de subjectieve visie, is KIC in dit proefschrift gedefinieerd als “[h]et vermogen van

individuen om ideeën te identificeren voor nieuwe producten, processen, praktijken of diensten in reactie op een bepaalde pijn, een probleem of een nieuwe marktbehoefte” (Baggen et al., 2015, p. 417). Tot slot worden in Hoofdstuk 2 bestaande instrumenten om KIC te meten bediscussieerd. Deze discussie leidt tot de conclusie dat bestaande instrumenten niet het daadwerkelijke denken of gedrag van mensen lijken te meten, maar in plaats daarvan percepties (zoals het geval bij een zelfbeoordeling van KIC). Om deze reden suggereren verschillende auteurs om het denken of gedrag van werknemers te meten door gedragstesten te ontwikkelen.

In lijn met deze suggestie wordt in Hoofdstuk 3 de deelvraag *“Wat is een geschikt instrument voor het meten van KIC?”* behandeld. Een gedragstest, naar verwezen als de *“kansenidentificatie competentie assessment test”* (KICAT, in het proefschrift *“opportunity identification competence assessment test”*, OICAT), is ontwikkeld en getest onder 115 Nederlandse masterstudenten en 142 Portugese bachelorstudenten. Het hoger onderwijs werd gekozen als een geschikte omgeving voor het testen van KICAT voordat het onder werknemers gebruikt zou worden. De KICAT bestond uit twee taken: Taak 1, het genereren van bedrijfsideeën, en Taak 2, het evalueren van bedrijfsideeën. Taak 1 is ontwikkeld op basis van literatuur over creativiteit. Respondenten werden voor Taak 1 gevraagd om in 10 minuten tijd zoveel mogelijk ideeën te genereren op basis van een casus over duurzame ontwikkeling. Taak 2 is ontwikkeld op basis van literatuur over cognitie, en meer specifiek op basis van een studie van Baron en Ensley (2006) over de verschillen tussen de cognitieve raamwerken van beginnende en ervaren ondernemers. Cognitieve raamwerken functioneren als een soort template, en helpen bij het herkennen van betekenisvolle patronen en relaties tussen ogenschijnlijk onafhankelijke gebeurtenissen en informatie. In Taak 2 werden 10 argumenten gepresenteerd: vijf argumenten waren afgeleid van het cognitieve raamwerk van een beginnende ondernemer, en vijf argumenten waren afgeleid van het cognitieve raamwerk van een ervaren ondernemer. De respondenten werden gevraagd om in vijf minuten de vijf argumenten te selecteren, die zij het meest belangrijk achtten bij het evalueren van de potentie voor succes van bedrijfsideeën. De resultaten van deze empirische studie laten zien dat de KICAT gebruikt kan worden om verschillen tussen individuen in kaart te brengen. Daarnaast is er geen correlatie tussen Taak 1 en Taak 2 gevonden, wat suggereert dat het KI proces uit verschillende subfases bestaat waarin mensen met verschillende competenties nodig zijn. Na het conceptualiseren (Hoofdstuk 2) en operationaliseren (Hoofdstuk 3) van KIC, is vervolgens de KIC van werknemers verder onderzocht.



In Hoofdstuk 4 wordt onderzocht welke antecedenten van invloed zijn op KIC van individuen. Bij het bestuderen van antecedenten is het zinvol om te kijken naar het leeraspect in ondernemerschap. Onderzoekers verwijzen specifiek naar KIC als een belangrijke uitkomst van ondernemend leren. De deelvraag van dit hoofdstuk was dan ook *“Wat zijn antecedenten van KIC (als uitkomst van ondernemend leren) van individuen in het MKB?”* Het 3-P model (vooraf gegeven [presage], proces en product) van Tynjälä wordt gebruikt om verder te onderzoeken welke antecedenten de KIC van individuen beïnvloedt. De vooraf gegeven factoren zijn kenmerken van de lerende en de werkomgeving. Het proces relateert aan de daadwerkelijke deelname aan ondernemerschapsactiviteiten. Op basis van literatuur over onafhankelijk ondernemerschap en organisatieleren, zijn factoren gerelateerd aan de lerende, werkomgeving en het proces geselecteerd die KIC kunnen beïnvloeden. In totaal hebben 234 werknemers van 12 bestaande bedrijven aan het onderzoek meegedaan middels het invullen van een vragenlijst. De bedrijven waren met name actief in de agrarische, voedsel, en papierindustrie. De uitkomstvariabele in het geteste model was KIC, geoperationaliseerd als het aantal ideeën van een werknemer die in de afgelopen drie jaar zijn overgenomen door het management. De resultaten laten zien dat zelfgepercipieerd creatief zelfvertrouwen en de daadwerkelijk deelname aan ondernemerschapsactiviteiten (oftewel: het proces) de KIC van individuen positief beïnvloeden. Werkomgevingsfactoren relateerden enkel indirect aan de KIC van individuen.

In Hoofdstuk 5 worden het individuele en het teamniveau in de analyse meegenomen. In de studie uit Hoofdstuk 5 is KI onderzocht vanuit het cognitieve perspectief, welke ook is toegepast in Hoofdstuk 3 voor het ontwikkelen van KICAT Taak 2. In dit hoofdstuk worden de volgende twee deelvragen besproken: (1) *“In welke mate verschillen de cognitieve KI raamwerken van individuele werknemers en teams?”* En (2) *“In welke mate matchen de cognitieve KI raamwerken van individuele werknemers en teams met het cognitieve KI raamwerk van een ervaren, onafhankelijke ondernemer?”* Het cognitieve raamwerk van ervaren, onafhankelijke ondernemers verkregen uit de literatuur is gebruikt om de verschillen in KI tussen individuen en teams te interpreteren. Het is aannemelijk dat het cognitieve raamwerk van ervaren ondernemers van goede kwaliteit is, omdat het door de jaren heen verfijnd, bediscussieerd en aangescherpt is. Voor deze studie zijn gegevens verzameld onder dezelfde respondenten als in Hoofdstuk 4. De respondenten hebben Taak 2 van de KICAT namelijk zowel individueel als in teamverband van vier of vijf personen uitgevoerd. De belangrijkste les die uit deze studie getrokken kan worden, is dat individuen en teams verschillende

cognitieve raamwerken gebruiken voor het identificeren van kansen. Daarbij suggereren de resultaten dat het cognitieve KI raamwerk van teams meer gelijkenissen vertoont met het cognitieve raamwerk van ervaren, onafhankelijke ondernemers, dan het cognitieve KI raamwerk van individuele werknemers. De resultaten suggereren daarmee dat de betrokkenheid van teams belangrijk is vanaf de start van het ondernemerschapsproces.

### **Theoretische implicaties**

In Hoofdstuk 6 worden de resultaten van deze dissertatie besproken tegen de achtergrond van de drie overkoepelende onderzoekskwesties zoals gepresenteerd in Hoofdstuk 1 (en in de probleemstelling van deze samenvatting). Vogel (2016) heeft een raamwerk ontwikkeld voor het gehele ondernemerschapsproces. Zijn raamwerk is gebruikt om te reflecteren op de eerste onderzoekskwestie, namelijk *het definiëren van het KI-proces*. Met het specificeren van de activiteit “het evalueren van bedrijfsideeën” (zie Hoofdstuk 3), leveren de resultaten van dit proefschrift een bijdrage aan het raamwerk van Vogel (2016) door deze activiteit aan het proces toe te voegen. Daarnaast is het raamwerk van Vogel (2016) gebruikt om te reflecteren op de gebruikte instrumenten in deze dissertatie, door te interpreteren welk stukje uit het ondernemerschapsproces precies is gemeten met de instrumenten.

Vervolgens wordt ten aanzien van de tweede onderzoekskwestie, *het definiëren van KIC*, gereflecteerd op twee kenmerken van competentietheorie: (1) de ontwikkelbaarheid van competenties en (2) de context-specificiteit van competenties. Ten eerste suggereren de resultaten van deze dissertatie dat werknemers leren door te doen. Met enige voorzichtigheid kan uit dit resultaat opgemaakt worden dat werknemers kunnen leren om kansen te identificeren. Hoewel het niet mogelijk is om op basis van de resultaten van dit proefschrift zonder twijfel te concluderen of individuen KIC kunnen ontwikkelen, geven de resultaten van deze dissertatie en van eerdere onderzoeken wel degelijk redenen om te geloven dat individuen KIC kunnen ontwikkelen. Ten tweede wordt bediscussieerd dat KIC relevant kan zijn voor werknemers met allerlei verschillende functies. Wel kunnen er verschillen zijn tussen enerzijds productiewerkers die mogelijk minder ontwikkelde KIC nodig hebben en anderzijds managers, onderzoekers, en werknemers met tijdelijke contracten die mogelijk meer ontwikkelde KIC nodig hebben. Zowel de verwachtingen en doelen van de werkgever als de persoonlijke doelen en wensen van de werknemer bepalen in welke mate werknemers KIC (zouden moeten) hebben.

Ten aanzien van de derde onderzoekswestie, *het meten van KIC*, hebben de resultaten laten zien dat KICAT toegepast kan worden onder verschillende respondenten (zoals studenten en werknemers werkzaam voor verschillende bedrijven), dat het bruikbare resultaten voor onderzoek oplevert, en dat het positief wordt ontvangen in de praktijk. Vanuit het perspectief van het onderwijs past de KICAT bij de ontwikkeling van “assessment *van* leren” naar “assessment *voor* leren”. Dit betekent dat een test niet alleen gebruikt wordt voor het beoordelen van de lerende, maar ook om rijke en constructieve feedback aan de lerende te geven over zijn of haar competentie ontwikkeling.

Vervolgens worden in Hoofdstuk 6 verschillende beperkingen van de studies zoals gepresenteerd in deze dissertatie besproken, evenals suggesties voor toekomstig onderzoek.

### **Praktische implicaties**

In Hoofdstuk 6 worden praktische implicaties op drie niveaus besproken: implicaties voor het MKB, voor het hoger onderwijs en voor beleid. Het belangrijkste doel van deze sectie is om de discussie aan te wakkeren over de betekenis van ondernemerschap in de praktijk, en meer specifiek die van KI. Om ondernemerschap verder te bevorderen als een waardevolle eigenschap van mensen en een waardevol proces voor de samenleving, worden concrete richtlijnen en ideeën besproken. Een brede definitie van ondernemerschap wordt daarbij bepleit: een definitie waarin ondernemerschap belangrijk wordt gevonden voor het dagelijkse (werk)leven en welke nieuwe waardecreatie tot doel heeft. In een dergelijke benadering ten aanzien van ondernemerschap kan KIC functioneren als een specifiek, meetbaar en ontwikkelbaar competentie domein dat onderdeel is van ieder ondernemerschapsproces.

### **Conclusie**

De centrale onderzoeksvraag van deze dissertatie was: *“Wat kenmerkt kansidentificatie door werknemers op het individuele en team niveau?”* De resultaten suggereren dat KI aandacht verdient in bestaande bedrijven: het is een betekenisvol proces dat tot nieuwe waardecreatie kan leiden en is een relevante capaciteit van werknemers. KIC is een gefaseerd fenomeen dat uit twee belangrijke competenties bestaat, namelijk het genereren van bedrijfsideeën en het evalueren van bedrijfsideeën. Werknemers kunnen beide of één van deze competenties in grotere mate beheersen (het genereren en/of evalueren van bedrijfsideeën). Organisaties hebben werknemers nodig die ideeën kunnen genereren en werknemers die de potentie voor succes van ideeën kunnen

evalueren. Verder suggereren de resultaten van deze dissertatie dat werknemers, net als onafhankelijke ondernemers, dergelijke competenties kunnen ontwikkelen door te doen. Dit betekent dat het belangrijk is om werknemers te betrekken bij ondernemerschapsactiviteiten op de werkvloer. Het creëren van teams kan een oplossing zijn voor het bij elkaar brengen van de benodigde competenties om succesvol kansen te kunnen identificeren. Daarbij suggereren de resultaten dat de betrokkenheid van teams direct vanaf het begin van het ondernemerschapsproces relevant kan zijn, omdat het cognitieve raamwerk van teams effectiever lijkt te zijn voor het identificeren van kansen, dan het cognitieve raamwerk van individuen.

Alles bij elkaar genomen, worden kansen bij de cruciale start van het ondernemerschapsproces geïdentificeerd door individuen of, bij voorkeur, door teams. Dit gebeurt in een proces waarin bedrijfsideeën worden gegenereerd en geëvalueerd voor hun potentie voor succes. Bij het bestuderen van kansen en hun identificatie dienen onderzoekers rekening te houden met de verschillen in KIC tussen MKBs, werknemers, en zelfs binnen KIC (tussen het genereren van bedrijfsideeën en het evalueren van bedrijfsideeën). Ook in de praktijk dient met deze verschillen rekening te worden gehouden bij het selecteren en managen van werknemers, bij het testen van KIC en bij het samenstellen van teams, omdat teams zowel generatoren als evaluatoren van bedrijfsideeën nodig hebben.

## Reflection on myself as an entrepreneurial researcher

To conclude, as the author of this dissertation, I would like to take the opportunity to reflect on my personal experiences while working towards my doctorate degree. I believe strongly in preparing all learners for a life full of entrepreneurial challenges by having them learn through entrepreneurship. As a PhD candidate investigating entrepreneurial processes in higher education and existing firms, I frequently wondered: to what degree is entrepreneurialism important in my own job? Can I truly recognise the importance of entrepreneurship across contexts, and also in my own working context?

In answering this question, I would like to look back at my PhD programme. I experienced many different challenges during the previous three years. First of all, I experienced a conceptual challenge while working to discover what opportunities are and how they come into being. Reading about opportunity identification (OI) was not in itself enough to achieve an understanding of opportunities. Brainstorm sessions with my supervisors, conversations with employees from the companies that participated in the research project and discussions with researchers from other fields (such as psychology and economy) are all examples of activities that contributed to my understanding of OI.

Secondly, I experienced the challenge of enlisting companies that were willing to participate in my research project. At the very beginning of my PhD programme, my supervisors introduced me to their contacts and helped me to find the right networks and people to contact companies. Next, I contacted many network initiatives and companies myself about the research project. Of course they asked me, "What's in it for me?" I had to create materials that I could share with companies, and I aimed to build a relationship with them and to create relevant value for the participating companies. I believe I visited over fifty companies in order to convince them that participation could be valuable for them. I have had the great help of my supervisors, and of organisations such as VAPA and the Institute for Sustainable Process Technology (ISPT) (see the illustrative cases in Chapter 6) in finding companies and connecting with them.

Thirdly, I experienced challenges working in a European research team. It was great to collect data in Germany, Switzerland and Slovakia, and to experience the differences in context and culture between those countries and the Netherlands. Overcoming language barriers, translating the instrument into different languages (English, German, and Slovak), and interacting with employees from these countries resulted in new challenges. Furthermore, participating in joint research projects with

researchers abroad was a new experience, in which I learned from other ways of working, collaborating from a distance, and dealing with all kinds of research cultures.

What these challenges have in common is that they are all characterised by complexity and uncertainty. And complexity and uncertainty are precisely what an entrepreneur needs to be able to handle (Gibb, 2002 for example). I do recognise the relevance of entrepreneurialism for researchers. Conducting research is much more than just reading the literature, collecting data and writing articles. Gibb (2002) describes characteristics of the new “life world” of entrepreneurship; in my opinion, many of these characteristics are recognisable for a wide range of people. Comments included, for instance: “greater freedom and ownership”; “greater control over what goes on”; “more autonomy to make things happen”; “doing everything – coping with wider range of management tasks”; “wider interdependence of a range of stakeholders”; “‘know-who’ becomes much more important – to build trust”; “more learning by doing, under pressure (more tacit than explicit)” (Gibb, 2002, p. 137).

The association of universities in the Netherlands (VSNU) collaborated on developing a competency instrument for researchers from Dutch universities. According to the VSNU and partners, entrepreneurship is one of the competencies researchers need (VSNU-NOA, 2016). They define entrepreneurship with indicators such as, “looks for opportunities”, “dares to do new things”, “generates new ideas”, “conducts market- or environmental research”, “puts forward what investments are needed to respond to opportunities in the market”, and “dares to take (manageable) risks” (p. 30). Furthermore, competencies such as, “sense of initiative” (p. 29) and “networking” (p. 15) are mentioned in the competency instrument. This shows that the meaning of entrepreneurship and other “new” competencies in the research context are being acknowledged by important organisations in the field. Still, in descriptions of PhD positions advertised, these kinds of competencies are hardly mentioned. Most descriptions list requirements related to writing, presentation, communication, statistics and collaboration skills. Here and there, requirements such as “a pioneering spirit”, “proactive”, and “creative” are named. If this trend of requiring such competencies continues, I think (and hope) that entrepreneurialism in the research context will increasingly be implemented.

In conclusion I would like to stress that I greatly enjoyed working on such a variety of tasks and experiencing so much freedom and responsibility on the research project. Although dealing with complexity and uncertainty is sometimes hard, it can result in many opportunities and great experiences. Therefore I would like to support the notion of Lackéus (2015) and Gibb (2002) that entrepreneurship should be fun and

enjoyable, not scary (which, unfortunately, is how it is often perceived). Uncertainty and complexity are becoming part of everyday life, and entrepreneurialism – and more specifically, being able to identify and explore opportunities – can help in dealing with uncertainty and complexity.





## Dankwoord

Na mijn studie wilde ik niet promoveren. Het leek me saai en toch zit ik nu, bijna vier jaar later, met veel plezier mijn dankwoord te schrijven. Het begon toen mijn toenmalig leidinggevende bij het ICLON, Maarten, informeerde of ik niet geïnteresseerd zou zijn in een promotietraject. Langzaam begon ik de overweging te maken en kwam ik terug bij mijn conclusie dat dit saai zou zijn. Na een jaar met veel plezier bij het ICLON te hebben gewerkt, kwam het LLLight'in'Europe project voorbij. Ik dacht: als ik ga promoveren, dan heel graag bij zo'n internationaal project over ondernemerschap! Dank jullie wel Kees, Heleen, Inge, Maarten en Klaas. Jullie hebben me gestimuleerd om deze kans niet aan me voorbij te laten gaan.

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## About the author

Yvette Baggen was born on October 28, 1988, in Voorburg. After finishing fundamental education, Yvette obtained a bachelor's degree in educational sciences at Utrecht University. Thereafter, she obtained the master's degree Educational Design and Consultancy at Utrecht University cum laude. In 2012, Yvette started her career as an educational consultant and trainer at ICLON, Leiden University. Her work for ICLON was directed towards consultancy and training activities related to (for instance) blended learning and assessment for teachers, management teams, and administrators in higher education institutions. Next, in 2013, she started her PhD trajectory, which was part of the European funded LLLight'in'Europe research project, at Wageningen University & Research at the Education and Competence Studies group. Currently, Yvette is working for the Department of Education at Utrecht University as a postdoctoral researcher and teacher on the topic learning in organisations.

### Peer reviewed publications

- Baggen, Y., Lans, H., Biemans, H. J. A., Kampen, J., & Mulder, M. (2016). Fostering entrepreneurial learning on-the-job: Evidence from innovative small and medium-sized companies in Europe. *European Journal of Education, 51*, 193-209. doi:10.1111/ejed.12171
- Baggen, Y., Mainert, J., Lans, T., Biemans, H. J. A., Greiff, S., & Mulder, M. (2015). Linking complex problem solving to opportunity identification competence within the context of entrepreneurship. *International Journal of Lifelong Education, 34*, 412-429. doi:10.1080/02601370.2015.1060029

### Manuscripts under review or in preparation

- Baggen, Y., Biemans, H. J. A., Kampen, J. K., Lans, T., & Mulder, M. *Opportunity identification by individual employees and teams in an SME context*. Manuscript submitted for publication.
- Baggen, Y., Kampen, J. K., Naia, A., Biemans, H. J. A., Lans, T., & Mulder, M. *Development and application of the opportunity identification competence assessment test (OICAT) in higher education*. Manuscript submitted for publication.
- Baggen, Y., Mainert, J., Kretzschmar, A., Niepel, C., Lans, T., Biemans, H. J. A., Neubert, J. C., & Greiff, S. *Complex problems in entrepreneurship: Examining complex problem solving in the application of opportunity identification*. Manuscript in preparation.

Lans, T., Baggen, Y., & Ploum, L. J. L. *Towards more synergy in entrepreneurial competence research in entrepreneurship education*. Submitted for an edited book on entrepreneurship education.

van der Rijst, R. M., Baggen, Y., & Sjoer, E. (accepted with minor revisions). University teachers' learning paths during technological innovation in education. *International Journal for Academic Development*.

### Professional publications

Baggen, Y., Biemans, H. J. A., & Lans, T. (2015). *Realizing employee-driven entrepreneurship and innovativeness in enterprises*. Thematic report, retrieved from LLLight'in'Europe website: <http://www.lllightineurope.com/publications>

Lans, T., Biemans, H. J. A., & Baggen, Y. (2015). *High levels of individual and feed forward learning foster employee-driven entrepreneurship and innovativeness*. Policy brief, retrieved from LLLight'in'Europe website: <http://www.lllightineurope.com/policy-briefs/>

Lans, T., Biemans, H. J. A., & Baggen, Y. (2015). *Opportunity competence contributes to successfully leveraging ideas for entrepreneurship and innovativeness in enterprises*. Policy Brief, retrieved from LLLight'in'Europe website: [www.lllightineurope.com/publications](http://www.lllightineurope.com/publications)

### Presented conference papers

Baggen, Y., Biemans, H. J. A., Kampen, J. K., Lans, T., & Mulder, M. (2016, May). *Ondernemerschap in het MKB. Hoe individuele werknemers en teams kansen identificeren*. Paper presented at the Onderwijs Research Dagen (ORD), Rotterdam.

Baggen, Y., Kampen, J. K., Naia, A., Biemans, H. J. A., Lans, T., & Mulder, M. (2015, April). *Application and validity of the opportunity identification competence assessment test (OICAT)*. Paper presented at the European Seminar on Extension and Education, Wageningen.

Baggen, Y., Kampen, J. K., Naia, A., Biemans, H. J. A., Lans, T., & Mulder, M. (2015, June). *De ontwikkeling en toepassing van de "opportunity identification competence assessment test"*. Paper presented at the ORD, Leiden.

Baggen, Y., Kampen, J. K., Naia, A., Biemans, H. J. A., Lans, T., & Mulder, M. (2015, September). *Towards an opportunity identification competence assessment test (OICAT) for students in higher education*. Paper presented at the European Conference of Educational Research, Budapest.

- Baggen, Y., Kampen, J. K., Naia, A., Biemans, H. J. A., Lans, T., & Mulder, M. (2016). Towards an opportunity identification assessment test for students in higher education. In M. Täks, M. van Gelderen (Chairs), *Entrepreneurship education with impact: Learning from European experiences*. Symposium conducted at the Competence Conference, Wageningen.
- Baggen, Y., Lans, H., Biemans, H. J. A., Kampen, J., & Mulder, M. (2016, June). *Fostering entrepreneurial learning on-the-job: Evidence from innovative SMEs in Europe*. Paper presented at the International Human Resource Management Conference, Victoria.



in the context of the research school

**ico****Interuniversity Center for Educational Research****Completed Training and Supervision Plan****Yvette Baggen****Wageningen School of Social Sciences (WASS)**Wageningen School  
of Social Sciences

<b>Name of the activity</b>	<b>Department /Institute</b>	<b>Year</b>	<b>ECTS (1 = 28 hrs)</b>
<b>A) Project related competences</b>			
Learning in and for Vocations and Professions	ICO	2013	3
Competence Theory research and Practice	ICO, WASS	2014	3
An introduction to Multilevel Models with SPSS	ICO	2016	3
Introduction to Structural Equation Modelling using Mplus	Utrecht University	2015	1.5
ICO National Fall School	ICO	2015	1
ICO International Fall School	ICO	2014	3
<b>B) General research related competences</b>			
Information Literacy PhD including Endnote Introduction	WUR Library	2013	0.6
WASS Introduction Course	WUR	2015	1
ICO Introductory course	ICO	2014	5
Scientific Writing	WASS	2013	1.8
Writing Grant Proposals	WGS	2016	2
<b>C) Career related competences/personal development</b>			
Committee work		2014	4
• Management Team ECS		2016	
• Organisation BCCS day-out 2015			
• ICO Educational Committee			
<i>"Developing and testing OCAT. Assessing students' opportunity competence"</i>	ESEE	2015	1
<i>"Towards an opportunity identification competence assessment test (OICAT) of students in higher education"</i>	ECER	2015	1
<i>"Fostering entrepreneurial learning on -the-job. Evidence from innovative SMEs from Europe"</i>	IHRM	2016	1
Onderwijs Research Dagen (ORD) 2014 ( <i>only visited</i> )	ORD	2014	
<i>"Het meten van opportunity competence. De ontwikkeling en toepassing van OCAT onder studenten uit NL &amp; PT"</i>	ORD	2015	1
<i>"Ondernemerschap in het MKB. Hoe individuele werknemers en teams kansen identificeren"</i>	ORD	2016	1
<b>Total</b>			<b>33.9</b>

## Colophon

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