

**FOSTERING THE ENTREPRENEUR-OPPORTUNITY NEXUS  
IN ENTREPRENEURSHIP EDUCATION –**

A DESIGN SCIENCE APPROACH

Zur Erlangung des akademischen Grades eines Doktors der  
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DISSERTATION

von

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Эта работа посвящается моей маме.

Ты сделала все возможное и невозможное, чтобы у меня было то, чего у тебя  
никогда не могло быть в твоей жизни.



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# Abstract

The doctoral thesis uses the Design Science Research approach to investigate key concepts used in entrepreneurship education and subsequently develops, tests and evaluates a course design for opportunity recognition in an academic setting at the Karlsruhe Institute of Technology (KIT). Starting with a systematic literature review on entrepreneurial competences published in 2020 (Tittel and Terzidis, 2020), 57 critical entrepreneurial competences were compiled and categorized into an entrepreneurial competence framework. In addition, a conceptual definition for *competence* and *entrepreneurial competence* was developed and presented to the scientific community.

A qualitative study with 26 experts, including five entrepreneurship lecturers, ten entrepreneurs, seven consultants and four company experts, was conducted to validate the list of competences identified in the recent academic literature. The interviews were analyzed based on the text and content analysis framework proposed by Mayring (2014). As a result, the experts could confirm 39 of the initial entrepreneurial competencies. In addition, 22 new competences could be identified through inductive coding of the interviews. Based on that, critical implications for the development of entrepreneurial education could be developed and proposed. Both studies identified business idea generation and opportunity recognition as critical entrepreneurial competencies and highly relevant concepts for entrepreneurship. For that reason, a pedagogical intervention was developed, tested and evaluated in 12 entrepreneurship courses at the KIT.

A bibliometric analysis was performed to find scientific evidence and relevant associations between Ikigai and entrepreneurship. Using the Ikigai (生き甲斐) framework, a traditional Japanese concept for "life worth living", the four key pillars (What you love, what you are good at, what the world needs, what you can be paid for) were operationalized and implemented into the pedagogical setting. The opportunity recognition course framework was then quantitatively evaluated with a structural equation model (SEM) proposed by Hair et al. (2021). As a result, the personal values-business idea fit was identified to influence the business idea's desirability significantly. The subsequent interviews with the student teams reveal that the perceived profitability of the business idea also plays a crucial role in the perceived desirability of the business idea developed in class.





# Chapter 1

## Introduction

*"It was hard to stay focused and motivated knowing that the idea was not promising".*

-Entrepreneurship Course at HOC 2019-

It is generally agreed today that entrepreneurship is an essential driver of economic development, employment, innovation, and productivity growth (OECD, 2003; BMWi, 2019; Carree and Thurik, 2010; Wilson, 2008). Therefore, policymakers, educators, and other stakeholders are concerned about developing entrepreneurship support and education programs and infrastructure, creating incubators and accelerators worldwide to support entrepreneurs and foster entrepreneurial activities in the ecosystems. In this context, the role played by young people, the current generation, is particularly important. In their Regional Entrepreneurship and Development Index, the European Commission describes a shift from a "managed" economy to an "entrepreneurial" economy as one of the significant challenges for developed economies in the last few decades (Szerb et al., 2013, p. 1). The role of human and intellectual capital is increasing. Thus, individuals rather than large firms are the leading factor in new knowledge creation (ibid). The Organization for Economic Co-operation and Development (OECD) estimates 35 million missing entrepreneurs in the European Union and OECD countries (OECD and Commission, 2021). Therefore, entrepreneurship is defined as a key competence for European citizens to "sustain current standards of living, support high rates of employment and foster social cohesion in the light of tomorrow's society and world of work" (Commission, 2018, p. 1). Universities, as a hotbed for technology and innovation, play a significant role in developing students' entrepreneurial competences and entrepreneurial support programs and contributing to the local entrepreneurial ecosystems to foster entrepreneurial activities. Moreover, entrepreneurship education can play a crucial role in promoting the connection between entrepreneurs and opportunities by teaching students the skills and knowledge needed to identify and pursue business opportunities. However, it is a noticeable fact that established tools and methods lack to provide founder-

centric frameworks and approaches to develop the connection between the entrepreneurial individual and the business opportunity.

Four significant themes in entrepreneurship as a research field and academic discipline emerged over the last decades: I) Opportunities, II) Individuals and work teams, III) The business organization, and IV) the general context (Busenitz et al., 2003). A recent holistic representation of the field is presented by Shepherd et al. (2021). Reviewing and analyzing the research field of entrepreneurship, the authors generated the following subtopics highly relevant for entrepreneurship: Lead founder, founding team, social relationships, cognition, emergent organizing, new-venture strategy, organizational emergence, new-venture legitimacy, founder exit, and entrepreneurial environment.

The doctoral thesis deals with key concepts, theoretical models and critical challenges in entrepreneurship and entrepreneurship education and uses psychological concepts to measure the effects of pedagogical interventions. It is dedicated to the scientific examination of key concepts, such as "entrepreneurial competence", and the practical development and testing of an opportunity recognition workshop, a pedagogical intervention in entrepreneurship education in an academic context at the Karlsruhe Institute of Technology (KIT).

Entrepreneurship education is a tool and an academic discipline for developing entrepreneurial competences. It aims to prepare students for entrepreneurial practice by developing their entrepreneurial mindset and competences and enabling young people to create innovative venture projects. However, as a young field of practice and research, the academic field of entrepreneurship education still deals with fundamental challenges. They include, in particular, a lack of a standard definition of key terms and concepts, such as entrepreneurship, entrepreneurship education, and entrepreneurial competence, harmonized and commonly accepted learning objectives, and teaching and evaluation methods of Entrepreneurship Education.

## 1.1 Motivation

The thesis is initialized and motivated by intense observations of challenges and shortcomings in entrepreneurship education theory and practice. For decades, scholars examined, discussed, and argued if entrepreneurship can be taught Henry et al. (2005a,b); Klein and Bullock (2006); Colette et al. (2005) and if entrepreneurship education affects entrepreneurial intentions of students (Prabandari, 2022; Liñán, 2004; Sánchez, 2013). Own first-hand experience as an entrepreneurship educator, trainer, mentor, and supervisor for Bachelor, Master's students, PhD candidates, and entrepreneurs provided profound insights into the needs and requirements of the target groups in different phases of a venture project. In addition, the study of empirical findings and state-of-the-art in the entrepreneurship and entrepreneurship

education domain revealed methodological, conceptual, and practical challenges that served as a motivational basis for further investigation. Moreover, the reflection on the pedagogical interventions in entrepreneurship education at the Karlsruhe Institute of Technology (KIT) (Germany), Karlsruhe University of Applied Sciences (Germany), the Aalto University (Finland), Eindhoven University (Netherlands), Strasbourg University (France) as well the Innopolis IT University in Kazan (Tatarstan, Russia), and the entrepreneurial courses and summer schools within EPICUR - a European University - revealed chances and opportunities for investigating critical topics and contributing to entrepreneurship education and practice. It provided a solid foundation for developing relevant research questions and creating ideas for impactful practical and theoretical contributions and pedagogical interventions. In addition, the motivation was to enable students to make educated and reflected decisions about their future personal and professional careers. The vision to contribute to a young discipline and provide knowledge, orientation and practical tools for future generations of entrepreneurs, entrepreneurship educators, and students guided the research activities. The initial questions which guided that research are:

- What exactly should educators teach in their entrepreneurship courses?
- Which teaching and learning formats should be used in entrepreneurship education?
- What is the right evaluation strategy to assess the specific course outcomes and learning objectives of the pedagogical interventions in entrepreneurial courses?
- How can we create learning experiences with a profound impact on the students

Based on the challenges and guiding questions described above, the thesis' aim is threefold. First, to conduct an in-depth analysis of the state-of-the-art in the entrepreneurial competence domain (Study 1). Second, to empirically investigate competences perceived as necessary and critical according to entrepreneurs, lecturers, business experts, and investors for entrepreneurial success in an early stage (Study 2). Third, based on the theoretical background derived from the literature and the empirical findings from the stakeholder interviews, a pedagogical intervention should be designed and performed, including the definition of learning objectives, teaching methods, and an evaluation strategy (Study 3). That study includes and addresses the main aspects and challenges from the field of opportunity recognition and evaluates the Ikigai framework in the context of Entrepreneurship Education.

The objective of entrepreneurship education is to prepare students for their future entrepreneurial activities. For that reason, educators develop educational offerings and prepare instructional designs to develop entrepreneurial competences (knowledge, skills and attitudes) in academic and practice-oriented settings. However, the scientific field of entrepreneurship in general and entrepreneurship education specifically is widely scattered.

Many challenges still exist and are critically discussed concerning learning objectives, learning outcomes, and assessment of entrepreneurship education measures. The heterogeneity of definitions and a scientific foundation regarding entrepreneurship and entrepreneurship education is discussed by many authors (Gartner, 1990; Bygrave and Hofer, 1992; Lackeus, 2015; Komarkova et al., 2015; Pittaway and Cope, 2007; Vesper and Gartner, 1997; Kuratko, 2005). Moreover, educators and researchers often lack a clear and harmonized theoretical understanding of competence to develop and provide effective competence-oriented entrepreneurship courses. This fact could be observed at the entrepreneurship education summit in Strasbourg, France, in 2017 and at the EXIST Workshop in Würzburg, Germany, in 2018. In a dedicated workshop with educators from 12 German universities, two key questions were presented to the EXIST workshop participants:

- Do you teach entrepreneurship at your home university?
- Please name the most important entrepreneurial competences!

As a result, 10 out of 14 participants indicated teaching entrepreneurship. The participants' essential entrepreneurial competences are presented in the word cloud (figure 1.1). According to educators, persistence (Durchhaltevermögen) is one of the top three entrepreneurial competences. In addition, communication, marketing, and sales can also be found on the list. However, terms such as intention, openness to new (things, ideas), self-efficacy, and entrepreneurial knowledge are also part of the terms mentioned as entrepreneurial competence. From the theoretical and conceptual perspective, these terms are not competences. They refer to other psychological constructs. As a result, a first vagueness of the critical terms for entrepreneurship education was identified and guided the subsequential research phases during the theses.

## 1.2 Problem statements and research questions

The ambiguity mentioned above served as a starting point for research activities in the area of Entrepreneurship Education. Based on that, diversity in the contents, learning objectives, teaching methods and evaluation approaches in the entrepreneurship education courses were identified, indicating that the discipline is highly fragmented. Theoretical rigour and consensus among the academic community on fundamental questions are still missing. As mentioned above, scholars and practitioners frequently and controversially discuss the effects of entrepreneurship education. For that reason, the role of an entrepreneurship researcher is to conduct fundamental and theoretically rigorous research Fiet (2001) and develop practical tools and methods (artefacts) for practice (Hevner et al., 2004; Johannesson and Perjons, 2014). The thesis comprises three consecutive empirical studies to develop a scientifically

## Bitte nennen Sie die für Sie 3 wichtigsten unternehmerischen Kompetenzen!

Mentimeter



10

Figure 1.1: Top entrepreneurial competences mentioned by the workshop participants

based pedagogical intervention. I) As a theoretical foundation, the concept of competence was examined through a systematic literature review with the following research questions:

- RQ 1.1: Which definitions for "competence" can be found in the literature?
- RQ 1.2: Which definitions for "entrepreneurial competence" (EC) can be found in the literature?
- RQ 1.3: Which entrepreneurial competences are considered important according to the authors?

As a result, a literature review was conducted and published in 2020 Tittel and Terzidis (2020). It provides four contributions: (1) It lists all definitions of "competence" and "entrepreneurial competence" found in the literature and shows overlaps and inconsistencies. (2) It suggests a consolidated definition of "entrepreneurial competence," consistent with prominent definitions in pedagogy, entrepreneurship literature and policy. (3) It creates a merged and consolidated list of all entrepreneurial competencies in the entrepreneurship literature. (4) It creates a category system for the list. II) Drawing upon theoretical perspectives from scholars in entrepreneurial competences, an exploratory qualitative study was conducted to provide practice-oriented insights from educators, business experts, entrepreneurs, investors, and mentors. The study aims to prove the previously developed framework and identify key competences highlighted by the interview partners highly involved in entrepreneurship support activities and programs. In this study, the following research questions were addressed:

- RQ 2.1: Which challenges do entrepreneurs face in their early stages?
- RQ 2.2: Which competences are considered to be essential from a practitioner's point of view?
- RQ 2.3: What are the implications for entrepreneurship education?

III) After identifying and compiling critical entrepreneurial competences based on the practical experience of the experts, an instructional design for a key entrepreneurial competence was developed. Scholars and practitioners agree that opportunity recognition is critical for entrepreneurship. For that reason, an opportunity recognition workshop was developed and tested in over 13 courses at the KIT. The initial problem observed in the entrepreneurship courses at the KIT is that a structured approach for business idea development and opportunity recognition was missing. As a result, students' business ideas are often not desirable, feasible, or innovative, demotivating them to exploit the business opportunities by starting their venture projects. To address the challenge, the Ikigai framework was used, adapted, and operationalized to meet the workshop requirements and provide the components within a structured framework. In this phase, the following research questions were developed and addressed:

- RQ 3.1: How can the Ikigai research community be characterized with respect to the number of main authors, relevant journals, key publications and geographical boundaries?
- RQ 3.2: What does Ikigai mean and which effects does it empirically have on the individuals?
- RQ 3.3: Which association of Ikigai and entrepreneurship can be found in the literature?
- RQ 3.4: How do the Ikigai components affect the perceived desirability of a business idea developed in class?

To evaluate the business ideas, validated and scientifically recognized intention models in motivational psychology were reviewed and served as the foundation for developing an instrument to measure the desirability of the business ideas developed in class.

## 1.3 Related Work and Publications

### Publications

- Manthey, S.I., Terzidis, O. and Tittel, A., 2022. Technology Application Selection–the TAS Framework: Finding promising applications for new and emerging technologies. KIT Scientific Working Papers. Vol. 180. DOI: 10.5445/IR/1000142279
- Belgardt, S., Doer, C., Hohmann, S., Karg, P., Rothfuß, S., Siebenrock, F., Stork, W., Terzidis, O., Tittel, A. and Zwick, T., 2021. Entrepreneurship für Ingenieure-Konzeption einer innovativen interdisziplinären Lehrveranstaltung. Handbuch Qualität in Studium, Lehre und Forschung, 76, p.67.
- Tittel, A. and Terzidis, O., 2020. Entrepreneurial competences revised: developing a consolidated and categorized list of entrepreneurial competences. Entrepreneurship Education, 3(1), pp.1-35.

### Conference contributions

- Tittel, A., Maisch, B., Wolf, B., Anzengruber, J., Terzidis, O., 2023. Ikigai - Traditional Approach for Modern Entrepreneurship? [Manuscript submitted to the EURAM 2023 in January 2023]
- Tittel, A., Terzidis, O. (2020). Opportunity Recognition. Theoretical Foundations and Workshop Operationalization. G-Forum 2020, 24th Interdisciplinary Entrepreneurship Conference. Karlsruhe
- Tittel, A. Terzidis, O. (2020) Vorstellung Workshopkonzept: Opportunity Recognition @KIT. International Entrepreneurship Education Summit. Stuttgart
- Tittel, A., Terzidis, O. (2018). Entrepreneurial Competences and their Relation to the Digital Transformation. A Systematic Literature Review. G-Forum 2018, 22nd Interdisciplinary Entrepreneurship Conference. Stuttgart
- Tittel, A., Terzidis, O. (2017). Evaluation of Entrepreneurship Education Programs. A Systematic Literature Review. G-Forum 2017, 21th Interdisciplinary Entrepreneurship Conference. Wuppertal
- Tittel, A., Terzidis, O. (2016). Developing an Entrepreneurship Master Program. Iterate program specification through a design thinking approach. G-Forum 2016, 20th Interdisciplinary Entrepreneurship Conference. Leipzig

- Tittel, A., Terzidis, O. (2014). Gründungskultur in Kasan - Erfassung und Analyse der kulturellen und sozioökonomischen Faktoren sowie deren Rahmenbedingungen. G-Forum 2014, 18th Interdisciplinary Entrepreneurship Conference. Oldenburg



# Chapter 2

## State Of the Art

*The entrepreneurial mystique? It is not magic, it is not mysterious, and it has nothing to do with the genes. It is a discipline. And, like any discipline, it can be learned.*

- Peter Drucker -

### 2.1 Entrepreneurship

This chapter presents and discusses the main concepts, key definitions and theories in entrepreneurship, education, and entrepreneurship education to provide a solid foundation for subsequent empirical studies in the following chapters.

In the academic field of entrepreneurship research, a single and consolidated definition of "entrepreneurship" does not exist. In his study, Gartner (1990) asked 44 business and academic experts to define the term entrepreneurship and found 90 attributes that characterized its meaning. As the field is highly diverse and traditions dominate its perception, schools, intended purposes and views, a discussion of central concepts and definitions is essential for the following work. The words *entrepreneurship* and *enterprise* both derive from the old French word *entrependre* and represents an undertaking. The phenomenon of entrepreneurship is not new. In the early stages of the history of humankind, people took risks exploring new countries, discovering new continents, and establishing new cities in unknown places. It is a noticeable fact that heroic figures like Alexander the Great (356 BC - 323 BC), Christopher Columbus (1451 - 1506), or even the thousands of people following the call of Katharina II. (1729 - 1796), to immigrate to rural areas in the Volga Region of Russia, stood up to the challenge, and took opportunities and risks of an unknown endeavour. For this reason, in former English terms, the entrepreneur was referred to as an adventurer (Fritsch, 2018).

In the context of economic activity and the development of modern perception of entrepreneurship, Jean-Baptiste Say (1767 - 1831) is recognized as the first economist who

pointed out the importance of an entrepreneur. According to Say (1803), an entrepreneur is a person who identifies a possibility to shift resources from a sector of lower into a sector of higher productivity. For him, it is about a creative change in the configuration of value creation brought forth by the entrepreneur. The same resources, such as land, animals, and people may be deployed and organized differently to harvest a better yield in agriculture. The Austrian economist Joseph Alois Schumpeter (1883 - 1950) decisively influenced the recent discussion about entrepreneurship. In his work, Schumpeter (1911), he points out that entrepreneurship is about new factor combinations leading to new products, production methods, or markets. Existing market behavior is disrupted whenever some new factor combination is used to drive innovation, and former products, processes, and organizations are eliminated. In that context, the entrepreneur fulfils the role of an agent of change. Since then, entrepreneurship has emerged in many forms, contexts and countries as a field of academic research and practice-oriented business activity. For instance, female entrepreneurship McAdam (2013); Estrin and Mickiewicz (2011), social entrepreneurship Peredo and McLean (2006); Martin and Osberg (2007), family entrepreneurship Heck and Mishra (2008); Bettinelli et al. (2014) have been subject of extensive research and special issues of entrepreneurship journals.

Today, the Organization for Economic Co-operation and Development (OECD) recognizes that "Entrepreneurship is at the heart of national and local economic growth. By innovating and seizing opportunities, entrepreneurs drive national and local economic change and competitiveness" (OECD, 2022). Personal motivations and drivers for entrepreneurial behavior are diverse. The current state of research shows that factors such as independence, self-realization, financial success, social recognition and role and innovation play an essential role in the entrepreneurial career choice (Carter et al., 2003). Moreover, empirical studies by Rauch and Frese (2007) show that underlying character traits are vital: Self-efficacy, proactive personality, tenacity, need for achievement, stress tolerance, goal orientation, need for autonomy, innovativeness, endurance, flexibility, and passion for work.

Nowadays, entrepreneurship is considered more than the creation of new venture companies. Especially with the introduction of the lean startup approach by Ries (2011), entrepreneurial activity is considered an iterative learning process. During the entrepreneurial journey, the entrepreneur learns about the target markets and the customer's needs, their problems, and the characteristics of the industry. Thus, entrepreneurship is about understanding patterns, recognizing business opportunities, and creating value for customers and society. Key definitions are provided by the OECD and the European Commission (2021, p. 18) and are used within the underlying thesis:

- **An entrepreneur** is an individual (business owner) who seeks to generate value, through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets.
- **An entrepreneurial activity** is the enterprising human action in pursuit of the generation of value, through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets.
- **Entrepreneurship** is the phenomenon associated with entrepreneurial activity.

To present different meanings and facets of the modern perception of entrepreneurship, the most prominent definitions from different perspectives were compiled and present an overview of integral elements offered by these interpretations (see table 2.1).

<b>Author</b>	<b>Definition</b>
Gartner (1988, p. 1)	Entrepreneurship is the creation of organizations.
Ahmad and Hoffmann (2008, p. 8)	Entrepreneurship is the phenomenon associated with entrepreneurial activity.
Byers et al. (2011, p. 4)	Entrepreneurship is more than the creation of a business and the wealth associated with it. It is focused on the creation of a new enterprise that serves society and makes a positive change.
Robert and Hisrich (2019, pp. 4-5)	Entrepreneurship is the process of creating something new with value by devoting the necessary time and effort assuming the accompanying financial, psychic, and social risks and uncertainties; and receiving the resulting rewards of monetary and personal satisfaction.
Rae and Carswell (2001, p. 152)	the process of identifying opportunities for creating or releasing value, and of forming ventures which bring together resources to exploit those opportunities.
Shane and Venkataraman (2000, p. 218)	(...) we define the field of entrepreneurship as the scholarly examination of how, by whom, and with what effects opportunities to create future goods and services are discovered, evaluated, and exploited.
Fueglistaller et al. (2012, p. 26)	We define entrepreneurship as the process of identifying and transforming new business opportunities into marketable products and services.

*Continued on next page*

Table 2.1 – *continued from previous page*

<b>Author.</b>	<b>Definition</b>
Commission (2005, p. 17))	Entrepreneurship refers to an individual's ability to turn ideas into action. It includes creativity, innovation and risk taking, as well as the ability to plan and manage projects in order to achieve objectives.
Bosma et al. (2021, p. 20)	Entrepreneurship is defined by GEM as the act of starting and running a new business.
Moberg et al. (2012, p. 14)	When you act upon opportunities and ideas and transform them into value for others. The value that is created can be financial, cultural, or social.
Byers et al. (2011, pos. 497)	Entrepreneurs identify opportunities, mobilize resources, execute on their vision and manage risks.

Table 2.1: Definitions of Entrepreneurship

## 2.2 Education and learning

In a Memorandum on Lifelong Learning by the European Commission (2000, p. 5), the role of education is highlighted by the following statement:

*"Today's Europeans live in a complex social and political world. More than ever before, individuals want to plan their own lives, are expected to contribute actively to society, and must learn to live positively with cultural, ethnic and linguistic diversity. Education, in its broadest sense, is the key to learning and understanding how to meet these challenges".*

However, the term education is not clearly defined in addition to the broad and diverse concept of entrepreneurship. Education is derived from the Latin words *educatum* (act of teaching or training), *educere* (to lead out, to draw out), and *educare* (to raise, to educate). Table 2.2 presents some definitions from a policy perspective. Based on the compilation of definitions in table 2.2, education is defined within the thesis as

The process of receiving or giving systematic instruction to transmit and acquire domain-specific competences that impart knowledge, skills and attitudes. These processes include effective and appropriate learning and teaching activities.

Source	Definition
Dictionary (2022)	The process of receiving or giving systematic instruction, especially at a school or university
ERIC (2022)	Education is the process of imparting or obtaining knowledge, attitudes, skills, or socially valued qualities of character or behavior – includes the philosophy, purposes, programs, methods, organizational patterns, etc., of the entire educational process as most broadly conceived.
OECD (2001a)	Education is defined as organised and sustained communication designed to bring about learning.

Table 2.2: Definitions of Education

As a core of education, the development of competences is described in Etling (1993, p. 72): "For me, education means learning knowledge, skills and attitudes". It is important to emphasize that neither teaching alone nor listening constitutes learning. It is the learner's responsibility and decision to incorporate the components of competences or not. Learning takes place in the classroom and in situations and settings outside the classroom. Thus, learning occurs in formal, informal and non-formal educational settings (ibid).

### 2.2.1 Formal education

Formal education is often associated with schools where participants can obtain certificates or degrees. Formal education is the "institutionalized, chronologically graded and hierarchically structured educational system, spanning lower primary school and the upper reaches of the university" (Coombs and Ahmed, 1974, p. 8). Formal learning refers to learning programs where the training department defines the goals and objectives, instructional designer or instructor. Typical examples are the entirety of grade school, university, and even new hire training at a place of employment. It includes classroom instruction, lectures, web-based training, workshops, seminars, etc. Moreover, in formal education, classroom attendance is often an essential requirement. The definition of formal learning illustrates the immanent connection between learning and education by the European Commission: "Learning that occurs in an organized and structured environment (in a school/training centre or on the job) and is explicitly designated as learning (in terms of objectives, time or resources). Formal learning is intentional from the learner's point of view. It typically leads to certification" (EU, 2005, p. 46).

### **2.2.2 Non-formal education**

Non-formal education features do not require the constant attendance of the participants and are characterized by a non-contiguous communication of participants and the teachers, decreasing the contact between teacher and student. Moreover, most activities take place outside the institution, for instance, at home. Non-formal education is "any organized, systematic, educational activity carried on outside the framework of the formal system to provide selected types of learning to particular subgroups in the population, adults as well as children" Coombs and Ahmed (1974) in La Belle (1982, pp. 161). It has also been defined as "any intentional and systematic educational enterprise (usually outside the traditional schooling) in which content is adapted to the unique needs of the students (or unique situations) in order to maximize other elements which often occupy formal school teachers, (i.e. taking roll, enforcing discipline, writing reports, supervising study hall, etc.)" (Kleis et al., 1973, p. 6). Furthermore, it is focused on the development of practical competences.

### **2.2.3 Informal education**

Informal education is "the lifelong process by which every person acquires and accumulates knowledge, skills, attitudes and insights from daily experiences and exposure to the environment" Coombs and Ahmed (1974) in La Belle (1982, pp. 161). Informal education deals with everyday experiences that are not planned or organized (Etling, 1993). When elders or peers interpret or explain these experiences, they constitute informal education (Kleis et al., 1973, pp. 3-4). An example of informal learning is when children learn to speak by imitating and listening to their parents, siblings, and friends.

### **2.2.4 Entrepreneurial learning**

Learning is critical to entrepreneurial effectiveness (Rae and Carswell, 2000). Therefore, it is vital to analyse entrepreneurs' learning processes and to understand approaches, patterns and mechanisms for future entrepreneurship courses and program development. Entrepreneurship is a dynamic form of social and economic behavior in which people interact with their environment, find opportunities and acquire resources with which they can be exploited (Shane and Venkataraman, 2000). Many authors explored the nature of entrepreneurial learning through different approaches (see Gibb (1987); Rae (2005, 2000); Politis (2005); Cope (2003); Deakins and Freel (1998). The consensus is that experience and discovery play a significant role in entrepreneurial learning. However, the academic literature on entrepreneurial learning is still fragmented and lacks a generally accepted theoretical understanding of entrepreneurship and learning exist(Rae and Carswell, 2001; Zamani and Mohammadi, 2018). In the individual learning literature, learning is described as an ongoing

process (Mumford, 1991). Similarly, entrepreneurial learning is considered an ongoing and continuous process that facilitates the development of entrepreneurship-specific competences (Politis, 2005). Moreover, Cope (2005) defined entrepreneurial learning as "learning experienced by entrepreneurs during the creation and development of a small enterprise" (p. 375). The authors Rae and Carswell (2001, p. 153) describe learning as the ability to act differently, including three dimensions: Knowing, doing and understanding/sense-making:

*"Learning is a discursive, sensemaking process in which people create new reality, by talking and doing, as they learn. Entrepreneurial learning is therefore concerned with how people construct new meaning in the process of recognizing and acting on opportunities, and of organizing and managing ventures. It is much more than acquiring the functional "knowing", for it involves active "doing" as well as understanding "what it is that works" and realizing that one "can do it"; therefore, knowing, acting and making sense are interconnected" .*

Through life story interviews, Rae and Carswell (2001); Rae (2005) studied the stories and experiences of entrepreneurs and explored the learning processes to develop entrepreneurial competences. They identified contexts in which learning and entrepreneurial experience are acquired: Family background, education and adolescence, previous jobs, vocational or professional learning, starting (learning by doing), growing and selling a venture. Later in 2005, Rae (2005) developed a model of entrepreneurial learning that consists of 3 main and 11 sub-themes. First, the theme "personal and social emergence" includes the individual's visions and future orientation, his or her social environment (parents and friends), and the development of entrepreneurial identity shaped by personal and professional experience, education, and social relationships. Second, the theme "contextual learning" describes the learning that occurs in different contexts, such as prior experience in specific industries, social and professional networks and communities. Finally, the concept of "negotiated enterprise" covers a venture's network and relationship character as an embedded entity that interacts with a network of partners, suppliers, customers, investors and competitors.

In their study with agricultural graduate entrepreneurs and the analysis of qualitative data, the authors Zamani and Mohammadi (2018) identified the following key aspects that had a significant impact on entrepreneurial learning: Previous work experience, learning from errors and failures, risk-taking propensity, tendency to be self-employed, persistence, use of various information sources, support from family and friends, job-related concerns, interest in practical courses and activities, passion for agriculture, and seeking or offering an alternative kind of thinking. Another qualitative study by Young and Sexton (2003) examined the learning motives and strategies of 10 successful entrepreneurs and found

that motivation for learning activities derives from external or internal problems. The main aspects are presented below (Young and Sexton, 2003, pp. 161):

1. **Originating source of pressure:** The original source of pressure to learn can be categorized as either external or internal. These are with respect to the operating domain of the business.
2. **Primary Pressure:** The originating source of pressure is generated from a primary form of discomfort or pressure on the entrepreneur or business.
3. **Primary Problem:** The primary source of pressure, in turn, surfaces as a "real problem" for the business or entrepreneur. This perceived "problem" could have either potentially negative (problem) or positive (opportunity) implications for the business.
4. **Motivating Realization:** The motivating realization occurs when the entrepreneur realizes that a gap exists between the actual and the desired state of knowledge or skills. She or he also understands that closing or eliminating this gap would be a significant step towards reaching a solution to the primary problem being faced.
5. **Motivating Categories:** The entrepreneur's motivation to learn by getting engaged in learning projects can be classified into four reactive categories: Unanticipated emergencies, unanticipated pressure/opportunities, gradually building pressure, ongoing obligations and expectations.

Moreover, Young and Sexton (2003) discovered the factors that motivate the undertaking of learning projects among entrepreneurs and presents internal and external learning processes. Information, data, and knowledge acquisition can occur outside the operating domain (university, visiting potential suppliers and manufacturers, having consultations with supervisors and mentors) and inside the operating system (analyzing project data, collecting product sales data, interacting with employees). On the other hand, through self-study (individual examination of various topics by accessing data banks, libraries, and research bureaus), entrepreneurs acquire knowledge on their own by reading newspapers, magazines, books and electronic media, attending seminars, workshops and conferences. However, according to Lave et al. (1991), most learning happens through various forms of social interactions. Thus, entrepreneurs consult experts, business associates, accountants, bankers, lawyers, and insurance agents and interact with professional and personal networks to get specific information and knowledge. Tables 2.3 and 2.4 give a summary of external and internal learning processes. Moreover, Deakins and Freel (1998) describe entrepreneurship and specifically the venture's growth process as "non-linear and discontinuous". "It is a process that is characterized by significant and critical learning events. The ability of entrepreneurs



to maximize knowledge as a result of experiencing these learning events will determine how successful their firm eventually becomes" (Deakins and Freel, 1998, p. 153). Especially in entrepreneurship context, experience is considered as a key factor of entrepreneurial learning (Gibb, 1987; Deakins and Freel, 1998; Garavan and O Cinneide, 1994; Politis, 2005; Kolb et al., 2001). Experiential learning is commonly defined as "a particular form of learning from life experience; often contrasted it with lecture and classroom learning" (Kolb, 2014, p. xviii). Kolb also describes it as "The process whereby knowledge is created through the transformation of experience" (Kolb, 1984, p. 41). Moreover, Politis (2005, p. 407) describes entrepreneurial learning as "an experiential process where the personal experience of an entrepreneur is transformed into knowledge, which in turn can be used to guide the choice of new experiences". The literature suggests at least three types of career experiences that are associated with entrepreneurial learning: Startup experience, management experience, and industry-specific experience (Politis, 2005). Previous research indicates that previous startup experience facilitates exploitation of entrepreneurial opportunities and enables founders to generate more income from their businesses (Shane, 2003; Gimeno et al., 1997; Dyke et al., 1992).

<b>Subcategory</b>	<b>Examples</b>
Self Study	Public information and media sources: Newspapers, magazines, books, internet, seminars, workshops, conferences
Cursory visits with others	Business associates: Suppliers, manufacturers Public sources: Data banks, libraries, research bureaus, Government agencies
Extended off-site consultation	Private individuals: Independent business owners. Business associates: Suppliers, manufacturers, competitors, Association members. Professionals: Accountants, bankers, lawyers, Insurance agencies, consultants, government agencies

Table 2.3: External learning processes. Adopted from (Young and Sexton, 2003, p. 175)

As another key factor, the amount of founders' general management experience has been identified as necessary with a significant impact on the ventures survival rate (Brüderl and Preisendörfer, 1998; Taylor, 1999) and on the individual's intention to create a new venture (Politis, 2005). Skills such as negotiation, leadership, planning, and problem-solving acquired through managerial experience are recognized as necessary not only in the management domain but also in the entrepreneurial context (Mitchelmore and Rowley, 2010; Shane, 2003). Moreover, industry-specific experience helps entrepreneurs identify opportunities and common business problems, use and develop personal and professional networks and

Subcategory	Examples
Self Study	Public information and media sources: Books, internet, government documents, public corporate and financial information etc. Analysis of company documents and reports: Formulation of implementation processes and procedures
Collaborative processes	Initializing problem-solving activities with associates and subordinates, retrieving and obtaining information with associates, from competitors, customers and suppliers
On-site expertise	Hire internal expert: Extensive monitoring of and interactions with experts, Examination of documents from suppliers and manufacturers
Extended on-site consultation	Private individuals: Independent business owners, customers. Business associates: Suppliers, manufacturers. Professionals: Bankers, Consultants

Table 2.4: Internal learning processes. Adopted from (Young and Sexton, 2003, p. 177)

acquire pilot customers. Entrepreneurs can use unfair advantage due to their insight and a better understanding of meeting demand conditions in the specific business or industry. Studies have shown that founders tend to start their business in industries they are familiar with or were employed in developing products and services related to their previous employer (Aldrich, 1999; Cooper et al., 1988; Bates and Servon, 2000).

Focus of traditional learning	Focus of entrepreneurial learning
The past	The future
Critical Analysis	Creativity
Knowledge	Insights
Passive understanding	Active understanding
Absolute detachment	emotional involvement
Manipulation of symbols	Manipulation of events
Written communication and neutrality	Personal communication and influence
Concept	Problem or opportunity

Table 2.5: Main characteristics of traditional and entrepreneurial learning. Source: adopted from Gibb (1987, p. 17)

Authors agree that education can provide cultural awareness, knowledge and skills for entrepreneurship, the "art" of entrepreneurial practice is learned experientially in business rather than in the educational environment (Gibb, 1993; Gorman et al., 1997; Jack and Anderson, 1999). The authors Rae and Carswell (2000) describe entrepreneurial learning as

a continuing social process of individuals. Thus, social interaction is of vital importance for the entrepreneurial learning process. The interaction and knowledge exchange with mentors, business owners, other entrepreneurs, or academic teachers can majorly impact entrepreneurs. In addition to that, in their investigation on entrepreneurial journeys, Zamani and Mohammadi (2018) found out that role models substantially impact entrepreneurial learning. Rae (2005) also sees learning through social interaction as contextual learning. "Contextual learning occurs through participation in community, industry and other networks in which individual experiences are related, compared and shared meaning is constructed" (Rae, 2005, p. 328). Thus, contextual learning is relational, functional and problem-solving in nature (ibid). According to Deakins and Freel (1998), critical factors for entrepreneurial learning are:

- Ability to network: Get access and contacts to industry partners in the relevant sector for industry specific insights and information, find co-founder or employees, attract business angels and investors
- Ability to assimilate experience and opportunity: The ability to learn from experience
- Ability to reflect on past strategy and mistakes: Learning by doing, reflecting on his/her own activities and adapting the strategy
- Ability to access resources: Business competencies (HR), financial resources, critical infrastructure
- Abilities of the entrepreneurial team: Composition of the entrepreneurial team with regard to complimentary competencies

The importance of social networking in university-based entrepreneurial learning is emphasised in a qualitative study by Lockett et al. (2017). By examining the entrepreneurial journeys of students and graduate entrepreneurs, it was found that the linkage of social networking and learning happens when the students engage in entrepreneurial activity before university. Students can better understand the relationship between social interaction and learning by being involved in a university's social and academic networks. They can develop, access and use a network of students, academics and entrepreneurs as guest speakers and academic mentors. Obtaining informal learning, e.g. through conversations, is essential to the student's entrepreneurial social capital. Thus, learning is a social process based on the experiences and interactions of students with their social environment, developing qualities such as responsibility, independent thinking and connectivity (Mueller and Anderson, 2014). The importance of experiences for entrepreneurial learning is shown by the study of Matlay et al. (2012). Through accumulating experiences, learning can result in knowledge, skills

and attributes which are the basis for entrepreneurial competences (ibid). Learning by doing and experiential learning are critical research results provided by Zamani and Mohammadi (2018). The entrepreneurial participants of the study either gained work experience in the family business during their studies or started to work after graduation. Nearly all participants mentioned that errors and failures made them learn from particular experiences. An empirical study by Bolinger and Brown (2015) examined the importance of entrepreneurial failure. As a form of troublesome knowledge, failure is challenging for students to be wholly appreciated. However, the study results showed that students with entrepreneurial experiences often see the consequences of failure more positively. Therefore, teaching students about and exposing them to entrepreneurial failure is crucial and challenging to highlight the possibilities and shortcomings of pursuing entrepreneurial opportunities. In their study, Yamakawa and Cardon (2015) investigated how failure impacts perceptions of learning. They were able to show that making mistakes positively affects learning. In addition, making own mistakes has a more substantial effect than learning from the mistakes of others.

## **2.3 Fundamentals for the development of educational interventions**

In this section, the vital pedagogical concepts are presented and discussed. The presented theories, tools, and definitions provide a theoretical foundation and are practical requirements for developing sound, methodically correct and empirically measurable opportunity recognition workshops. The presented concepts are state of the art and are widely used by educators to develop educational instructional designs.

### **2.3.1 Defining learning objectives and learning outcomes**

The transition of the degree programs to Bachelor and Master in the Bologna process caused considerable challenges for universities and education institutions. The reforms imply that the didactic structure of the learning process should no longer be thought of by the teachers and the content to be conveyed (teacher-oriented education) but from the perspective of the students and their learning process (student-oriented education). Consequently, it is required to plan the teaching and the course conception based on the learning objectives and focus on the acquisition of competencies. The competence-oriented course and curriculum development thus today shape the foundation for the teaching, learning, and examination design to be derived from it (Schaper et al., 2013). Formulating sound and methodically correct learning objectives is a crucial activity during a course design. A student-centred education and the explicit, precise formulation of learning objectives

allow a more effective design of teaching materials and a better selection of practical teaching and accurate assessment methods of competencies to evaluate the effectiveness of the pedagogical interventions. The learning objectives must be identified and well defined to develop learner-centred education courses or programs. In both the pedagogical literature and actual course descriptions, the terms "aims", "learning outcomes," and "learning objectives" can be found to describe often the same phenomena. Currently, there is no precise definition of the term "learning outcome" across whole Europe, or the rest of the globe (Stephen, 2004; CEDEFOP, 2017; Guide et al., 2009). As a result, scholars and practitioners use the terms interchangeably, creating potential confusion. For that reason, some learning outcomes definitions identified by Kennedy (2006, pp.20) and own desk research in relevant literature are presented and briefly discussed in table 2.6.

<b>Source</b>	<b>Definition</b>
Jenkins and Unwin (2001, p. 1)	Learning outcomes are statements of what is expected that a student will be able to DO as a result of a learning activity.
Kennedy (2006, p. 21)	Learning outcomes are statements of what a student is expected to know, understand and/or be able to demonstrate after completion of a process of learning.
EU (2005, p. 11)	The set of knowledge, skills and/or competences an individual has acquired and/or is able to demonstrate after completion of a learning process. Learning outcomes are statements of what a learner is expected to know, understand and/or be able to do at the end of a period of learning.
PEBA (2013, p. 3)	Learning outcomes describe the result of learning and studying that can be measured by exams and allow to determine the level of a competence that has been developed during the course (translated version from German).

Table 2.6: Definitions of Learning outcomes. Source: Stephen (2004, pp. 4)

Formal education aims to develop profound knowledge, skills, and attitudes (competences) in a particular domain. More specifically, entrepreneurship education aims to prepare students for entrepreneurial practice and develop entrepreneurial competences (Lackeus, 2015). Competence orientation has emerged as a central task and challenge for universities and academic institutions in implementing the Bologna Process. The core of competence orientation is that university teaching and education should enable students to solve domain-relevant problems in variable situations. Before defining the intended learning outcomes, it is essential to identify the qualifications and competences required in the specific domain. As assistance for developing courses and modules at universities, practical guidelines for

the definition of well-written learning objectives are provided to practitioners and educators by the educational departments of their home universities.

The KIT Guideline for the formulation of learning objectives SLE (2019) states that "learning objectives describe future and observable actions that can be determined and assessed. Ideally, the learning objectives are spread over several taxonomy levels but must be achievable within the specified time frame" (p. 3). In this work, this definition of a learning objective will be used for the development of the course framework. Before designing the course, the educator needs to have a clear understanding of the competences the students will have developed after the course. They need to be appropriate for the context and consider state of the art in the specific domain. An example for a formulation of a learning objective is illustrated as follows: *After conducting the course, the students can recall the definition of "entrepreneurship" introduced and discussed in class.* Based on that, the course designer should reflect on and define the appropriate teaching methods to achieve the intended objectives. Finally, he or she needs to define the appropriate evaluation methods that will measure the effectiveness of the intervention by measuring the actual students' performance.

In order to make competences and the associated performance requirements tangible and operational, it is, therefore, necessary to describe specific actions that allow the competence to be observed. Thus it is not the competence measured or observed, but an observable action (performance) used to infer the underlying competence (the underlying construct or the performance requirements). When formulating the learning outcomes, it should be noted that they describe the students' desired competences and should contain content and an action/ performance component. Furthermore, the learning objectives must be formulated in a concrete, clear and precise, challenging but realistic and verifiable manner (Schaper et al., 2013). Learning outcomes must be defined and expressed in simple and unambiguous terms to be clearly understood by students, lecturers and trainers. Therefore, learning objectives need to fulfil the criteria compiled and presented below. The following checklist is suggested to be used to formulate learning objectives. The objectives must be "verifiable, comprehensible and observable" Lokhoff et al. (2010, pp. 44):

- Specific (giving sufficient detail, written in clear language)
- Objective (formulated in a neutral way, avoiding opinions and ambiguities)
- Achievable (feasible in the given time frame and with the resources available)
- Useful (they should be perceived as relevant for higher education studies and civil society)
- Relevant (should contribute to the aim of the qualification involved)
- Standard-setting (indicate the standard to be achieved)

- Use an active verb form
- Use an indication of the type of learning outcome: knowledge, cognitive processes or skills
- The topic area of the learning outcome: this can be specific or general and refers to the subject matter, field of knowledge or a particular skill
- An indication of the standard or the level that is intended / achieved by the learning outcome
- The scope and/or context of the learning outcome.

As mentioned by the SLE (2019), the learning objectives should include and mention the levels of cognitive stages expressed by taxonomy levels. For that reason, the concept of the taxonomy is introduced in the next section.

### **2.3.2 Definition of taxonomy levels**

A useful and widely accepted framework for the definition of educational objectives is Bloom's taxonomy Bloom et al. (1984), which was later revised and adapted by one of his students (Krathwohl, 2002; Krathwohl and Anderson, 2009). The revised taxonomy is presented in fig. 2.2. Based on his empirical research, he classified the levels of cognitive stages during the learning process and proposed a hierarchy model of thinking. The model is presented in fig. 2.1. The taxonomy helps educators and program designers classify the intended learning objectives and evaluate their results after pedagogical instructions. Thus, by accurately defining learning objectives, the taxonomy also helps define reliable and appropriate test items for evaluation, which aligns with the constructive alignment framework described above. Moreover, together with his colleagues, he identified three educational activities or learning domains that need to be acquired after a pedagogical intervention or a learning episode. These three domains represent the concept of competence including *cognitive*: knowledge (mental skills), *psychomotor*: manual or physical skills and *affective* attitudes (growth in feelings or emotional areas).

For each step of Bloom's taxonomy, Bloom and other authors created lists of verbs that can be used to formulate the learning outcome on each specific level. The following list of verbs is compiled by Kennedy (2006) and serves as a guiding principle. The list is not supposed to be exhaustive and is often adapted to the specific context of the application. Also, the verbs may not be exclusive to one particular category. However, it is a good starting point and indication for the verbs and activities to be defined on specific levels. In addition to that, the Bloom (1956) suggests definitions of the key terms presented in table 2.7.

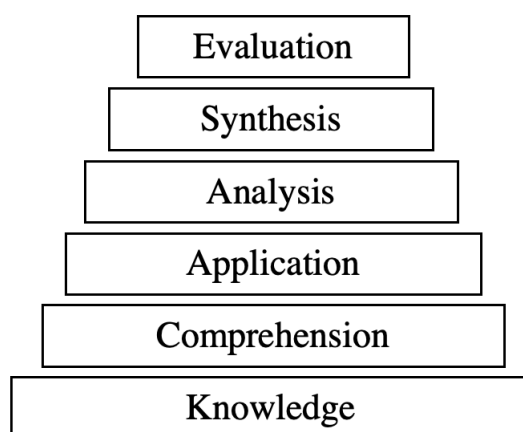


Figure 2.1: Bloom's Taxonomy. Adapted from (Kennedy, 2006, p. 27)

Level	Definition	Verbs
<b>1. Knowledge</b>	Knowledge may be defined as the ability to recall or remember facts without necessarily understanding them.	<b>Verbs for cognitive domain:</b> Arrange, collect, define, describe, duplicate, enumerate, examine, find, identify, label, list, memorise, name, order, outline, present, quote, recall, recognise, recollect, record, recount, relate, repeat, reproduce, show, state, tabulate, tell
<b>2. Comprehension</b>	Comprehension may be defined as the ability to understand and interpret learned information.	Associate, change, clarify, classify, construct, contrast, convert, decode, defend, describe, differentiate, discriminate, discuss, distinguish, estimate, explain, express, extend, generalise, identify, illustrate, indicate, infer, interpret, locate, paraphrase, predict, recognise, report, restate, rewrite, review, select, solve, translate.

*Continued on next page*



Table 2.7 – *continued from previous page*

Level	Definition	Verbs
<b>3. Application</b>	Application may be defined as the ability to use learned material in new situations, e.g. put ideas and concepts to work in solving problems.	Apply, assess, calculate, change, choose, complete, compute, construct, demonstrate, develop, discover, dramatise, employ, examine, experiment, find, illustrate, interpret, manipulate, modify, operate, organise, practice, predict, prepare, produce, relate, schedule, select, show, sketch, solve, transfer, use.
<b>4. Analysis</b>	Analysis may be defined as the ability to break down information into its components, e.g. look for inter-relationships and ideas (understanding of organisational structure).	Analyse, appraise, arrange, break down, calculate, categorise, classify, compare, connect, contrast, criticise, debate, deduce, determine, differentiate, discriminate, distinguish, divide, examine, experiment, identify, illustrate, infer, inspect, investigate, order, outline, point out, question, relate, separate, sub-divide, test.
<b>5. Synthesis</b>	Synthesis may be defined as the ability to put parts together.	Argue, arrange, assemble, categorise, collect, combine, compile, compose, construct, create, design, develop, devise, establish, explain, formulate, generalise, generate, integrate, invent, make, manage, modify, organise, originate, plan, prepare, propose, rearrange, reconstruct, relate, reorganise, revise, rewrite, set up, summarise.

*Continued on next page*

Table 2.7 – continued from previous page

Level	Definition	Verbs
<b>6. Evaluation</b>	Evaluation may be defined as the ability to judge the value of material for a given purpose.	Appraise, ascertain, argue, assess, attach, choose, compare, conclude, contrast, convince, criticise, decide, defend, discriminate, explain, evaluate, grade, interpret, judge, justify, measure, predict, rate, recommend, relate, resolve, revise, score, summarise, support, validate, value.

Table 2.7: Taxonomy Levels, Definitions and Verbs

**Verbs for psychometric domain:** Act, adhere, appreciate, ask, accept, answer, assist, attempt, challenge, combine, complete, conform, co-operate, defend, demonstrate (a belief in), differentiates, discuss, display, dispute, embrace, follow, hold, initiate, integrate, justify, listen, order, organise, participate, practice, join, share, judge, praise, question, relate, report, resolve, share, support, synthesise, value.

**Verbs for affective domain** Adapt, adjust, administer, alter, arrange, assemble, balance, bend, build, calibrate, choreograph, combine, construct, copy, design, deliver, detect, demonstrate, differentiate (by touch), dismantle, display, dissect, drive, estimate, examine, execute, fix, grasp, grind, handle, heat, manipulate, identify, measure, mend, mime, mimic, mix, operate, organise, perform (skilfully), present, record, refine, sketch, react, use.

## 2.4 Entrepreneurship education

Entrepreneurship education (EE) is one of the fastest growing fields of education globally (Solomon, 2007). It is an essential stimulus for entrepreneurial activities, creating jobs and welfare effects (Wong et al., 2005). The real benefit of EE is not limited to creating new ventures and jobs. It is a key to a self-determined and autonomous life (Hahn et al., 2017). For that reason, the European Entrepreneurship Competence Framework Bacigalupo et al. (2016) proposes a shared definition of entrepreneurship as a competence. Latest bibliometric analysis show the growth and evolution of scientific research on EE (see fig. 2.3). Entrepreneurship Education in pedagogical practice and as a research field, deals with the following five topics and guiding questions characterized by Fayolle and Gailly (2008); Fayolle (2018):

1. Target audience (For whom are educational offers developed?)

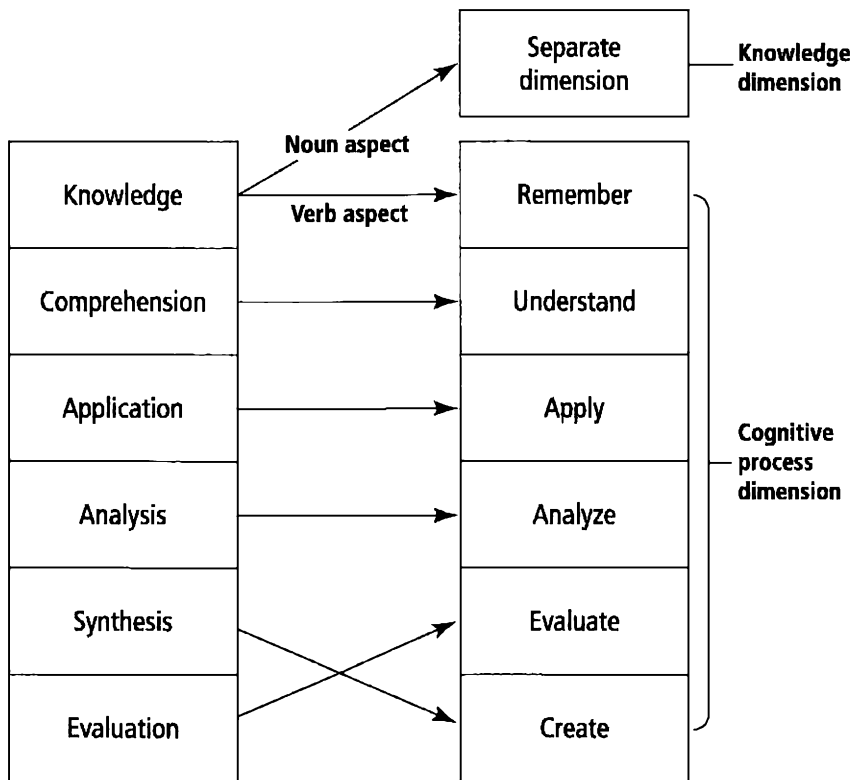


Figure 2.2: Summary of the structural changes from the original framework to the revised version. Source: Krathwohl and Anderson (2009, p. 268)

2. Content of knowledge (What to we teach?)
3. Evaluation and Assessments (What do we intend to teach and which results do we expect?)
4. Methods and pedagogies (How do we teach and what is the right pedagogical approach in entrepreneurship education?)
5. Goals and Objectives (Why do we teach entrepreneurship Education?)

EE is an essential stimulus for entrepreneurial activities, the creation of jobs and welfare effects (Wong et al., 2005). Although the consensus on the teachability of entrepreneurship has been established in the academic community (see Kolvereid and Moen (1997); Drucker (1985); Henry et al. (2005a,b); Garavan and O Cinneide (1994)), scholars have still a strong disagreement and lively debates on basic definitions of fundamental terms, such as entrepreneurship in general and entrepreneurship education specifically (Samwel Mwasalwiba, 2010).

The inherent lack of consensus is possible due to many facets and contributes to great confusion within the scientific community. On the one hand, historical, regional, and cultural

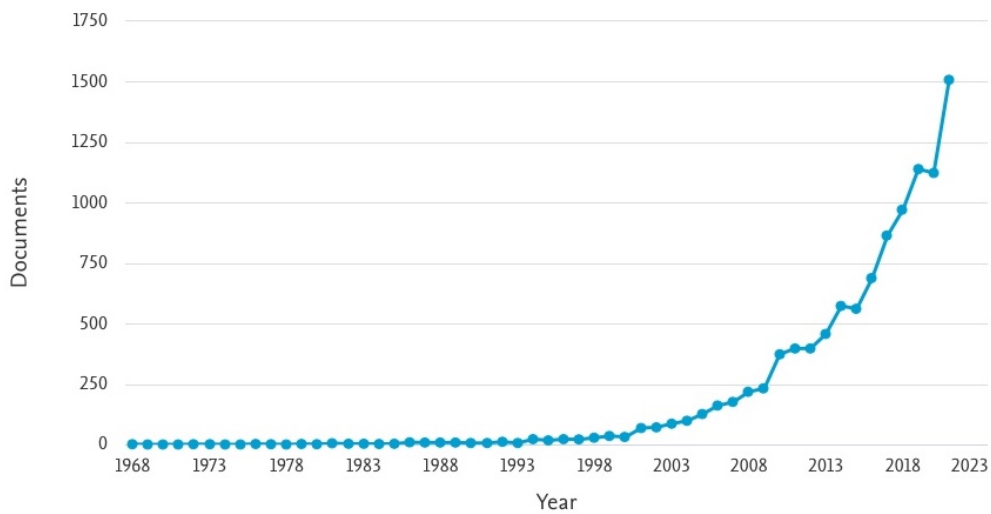


Figure 2.3: Evolution of scientific research on EE. Source: Scopus results for the search string "Entrepreneurship AND Education" Time frame: 1988-2022

influences determined the underlying assumptions and the understanding of entrepreneurship and entrepreneurship education. Consequently, the variety of stakeholders, including policymakers, academicians, students, and corporates involved in the development and promotion of the topic, has left lasting imprints due to their specific interests and objectives (ibid). The latest bibliometric study by Aparicio et al. (2019) shows that the work by Kuratko (2005) is the most cited paper in EE. In 2022 however, the insights and propositions made in 2005 may be outdated.

Studies have shown that entrepreneurship education programs contribute to the development of entrepreneurial intentions (Fayolle et al., 2006; Lüthje and Franke, 2003; Kolvereid and Moen, 1997; Peterman and Kennedy, 2003). Since the development of the first class in 1945 by the Harvard Business School, there is a rapid growth in the development and the introduction of entrepreneurship courses at universities worldwide. The development, its impact, and state of the art in the field of entrepreneurship education have been studied by many researchers (Pittaway and Cope, 2007; Kuratko, 2005; Solomon et al., 2002; Vesper and Gartner, 1997; Garavan and O Cinneide, 1994). However, the consensus on the teachability of entrepreneurship has been established (see Drucker (1985); Henry et al. (2005a,b); Garavan and O Cinneide (1994); Kolvereid and Moen (1997)), the academic community has still a strong disagreement on basic definitions of fundamental terms, such as entrepreneurship in general and entrepreneurship education (Samwel Mwasalwiba, 2010). The inherent lack of consensus is a possible result of many facets and contributes to great confusion within the scientific community. On the one hand, historical, regional, and cultural influences determine the underlying assumptions and the understanding of entrepreneurship and entrepreneurship education. On the other hand, the variety of stakeholders, including

policymakers, academicians, students, and corporates involved in the development and promotion of the topic, has left lasting imprints due to their specific interests and objectives (ibid). Moreover, the terms "entrepreneurship education" and "enterprise education", and "entrepreneurial education" are used interchangeably in the literature, which causes much confusion (Pittaway and Cope, 2007; Garavan and O Cinneide, 1994; Jones and Iredale, 2010). Jones and Iredale (2010, p. 11) offer a distinction between enterprise education and entrepreneurship education:

*"Entrepreneurship education focuses primarily on the needs of the entrepreneur, whereas enterprise education addresses the requirements of a wider range of stakeholders, including consumers and the community. However, the key difference between the two terms is that the primary focus of entrepreneurship education is on starting, growing and managing a business, whereas the primary focus of enterprise education is on the acquisition and development of personal skills, abilities and attributes that can be used in different contexts and throughout the life course."*

A generic teaching model for entrepreneurship presented by Fayolle and Gailly (2008) is a good starting point when designing and assessing entrepreneurship education. In the following sections, the key topics are introduced and described.

Based on the Gartner's conceptual framework for understanding and describing the complexity of entrepreneurship and new venture creation (Gartner, 1985), Matlay and Jones (2011) developed a framework of entrepreneurship education. In his framework Gartner (1985) described four dimensions that are involved in the creation of a new venture: (a) individual(s) – the person(s) involved in starting a new organization; (b) organization – the kind of firm that is started; (c) environment – the situation surrounding and influencing the new organization; and (d) new venture process – the actions undertaken by the individual(s) to start the venture (p. 698). Based on the venture creation framework, Matlay and Jones (2011) developed a student-centric conceptual framework for describing entrepreneurship education with five major interlinked elements: Educator, Community, Educational Process, Institution and Student. These elements consist of ten interrelated bilateral systems: student - educator; student - educational processes; student - institution; student - community; educator - educational processes; educator - institution; educator - community; educational processes - institution; educational processes - community; and the institution - community. The authors argue that effective entrepreneurship education results from a unique and customized set of dialogic relations between the systems.

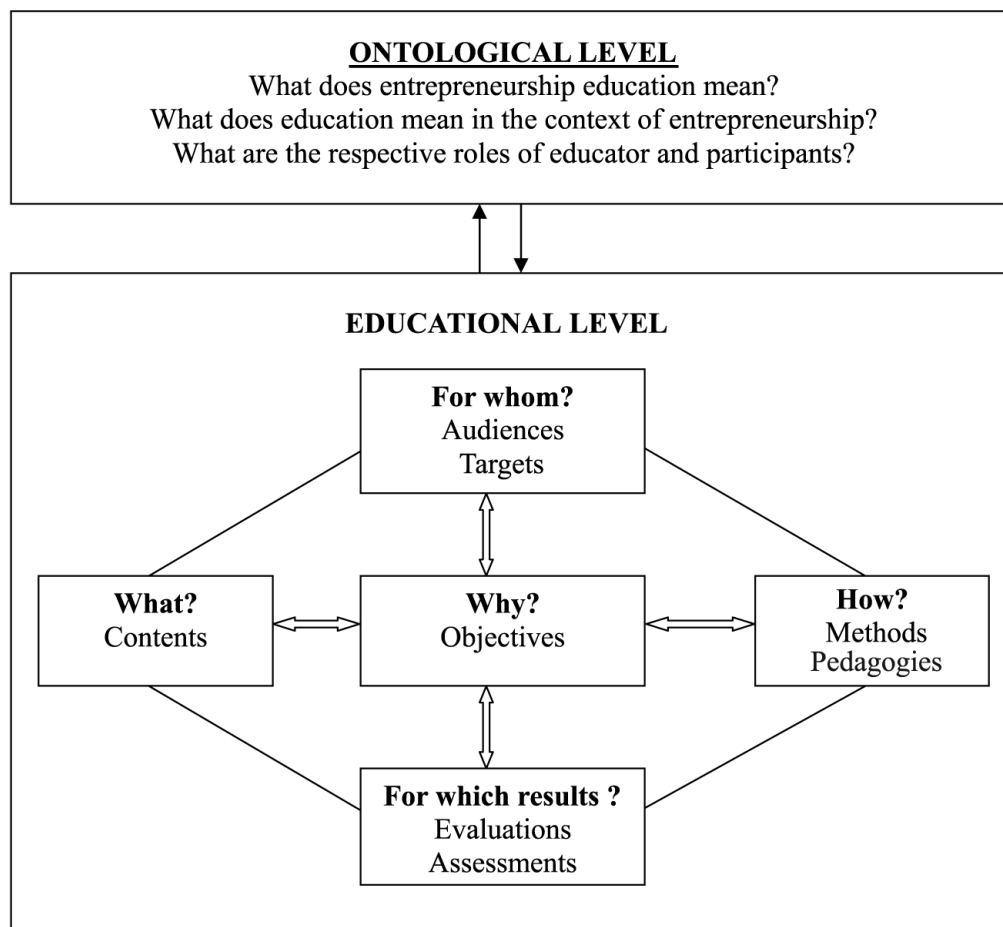


Figure 2.4: Teaching model framework for entrepreneurship education. Source: Fayolle and Gailly (2008, p. 572)

### 2.4.1 Definition of entrepreneurship education

A starting point to entering a field of study is developing a clear understanding of the examination subject. For that reason, a clear definition of entrepreneurship education is needed. As described above, a consolidated definition of the term does not exist. Instead, in his review, Samwel Mwasalwiba (2010) found out that very few authors have attempted to define the term entrepreneurship education specifically. Moreover, Samwel Mwasalwiba (2010, p.25) reports of "conflicting sides of entrepreneurship schools of thoughts" and a debates on the terms entrepreneurship education vs. entrepreneurial education (see Hynes (1996); Hytti (2002); Garavan and O Cinneide (1994)). Also, Hytti (2002, 53) describes the literature on enterprise education as "fragmented", which reflects the generally fragmented nature of the field. Moreover, regional differences exist. Entrepreneurship education is mainly used in America and Canada, whereas enterprise education is commonly used in the UK and Ireland. According to Garavan and O Cinneide (1994), enterprise education focuses

on developing enterprising people and a self-reliant attitude. Entrepreneurship education programs, on the other hand, aim to stimulate entrepreneurship. Furthermore, the authors Jones and English (2004) use entrepreneurship education and entrepreneurial education interchangeably.

<b>Author</b>	<b>Definition</b>
European Commission <sup>1</sup>	Entrepreneurship education prepares people to be responsible and enterprising individuals. It helps people develop the skills, knowledge, and attitudes necessary to achieve the goals they set out for themselves. Evidence also shows that people with entrepreneurial education are more employable.
Hindle (2007, p. 108)	knowledge transfer regarding how, by whom, and with what effects, opportunities to create future goods and services are discovered, evaluated and exploited.
Hahn et al. (2017, p. 948)	(...) pedagogical courses, programs and processes offered to students to develop or strengthen their entrepreneurial traits, attitudes and skills in general.
Henry et al. (2005a, p. 5)	Entrepreneurial education which is aimed at providing an opportunity to learn about the conditions favouring new business creation, as well as the various theories concerning the type of characteristics required for successful entrepreneurship.
Moberg et al. (2012, p. 14)	Content, 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.
Liñán (2004, p. 9)	the whole set of education and training activities -within the educational system or not- that try to develop in the participants the intention to perform entrepreneurial behaviors, or some of the elements that affect that intention, such as entrepreneurial knowledge, desirability of the entrepreneurial activity, or its feasibility.

*Continued on next page*

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<sup>1</sup>[https://ec.europa.eu/growth/smes/promoting-entrepreneurship/support/education\\_en](https://ec.europa.eu/growth/smes/promoting-entrepreneurship/support/education_en)

Table 2.8 – *continued from previous page*

Author	Definition
CELCEE <sup>2</sup>	the process of providing individuals with the concepts and skills to recognize opportunities that others have overlooked, and to have the insight, self-esteem and knowledge to act where others have hesitated.

Table 2.8: Definitions of Entrepreneurship Education

### 2.4.2 General objectives of entrepreneurship education

The main objective of EE is to develop some specific level of entrepreneurial competence and prepare students for entrepreneurial action (Lackeus, 2015). However, the heterogeneity in EE programs and differences in meaning of the words, objectives their target groups, teaching methods and evaluation strategies makes it challenging to compile and compare the overall objectives of EE (Gibb, 1993). The general course description may vary from the actual course content provided by the lecturer. Moreover, the design of course content is dependent on the practical experience, and theoretical knowledge of the lecturer (Sirelkhatim and Gangi, 2015; Hannon et al., 2006). Different objectives are defined on different levels. A) general program level (e.g. to foster entrepreneurial activities at a university, involve more students in entrepreneurial courses and projects) and b) on the course objective level where the definition of competence-oriented learning objectives plays a significant role. In the following chapter, different objectives of EE are compiled from literature and supported by a desk research study on existing learning outcomes defined by leading universities worldwide.

To structure and organize various learning objectives in EE, a meaningful categorization approach is needed. In the EE literature, an establishes categorization can be found and is applied by many authors: teaching *about*, *for* and *through* entrepreneurship (Sirelkhatim and Gangi, 2015; Hytti and O’Gorman, 2004; Lackeus, 2015; Samwel Mwasalwiba, 2010; Kirby, 2004).

Teaching **about** entrepreneurship is considered to be a theory-oriented teaching approach, aiming to give a general understanding and increase awareness of entrepreneurship as a potential career choice (Hytti and O’Gorman, 2004; Hytti et al., 2010). The learning objective here is the development of theoretical knowledge about entrepreneurship, including its socio-economic role, the history and basic concepts of entrepreneurship, entrepreneurial traits, as well as personality characteristics (Sirelkhatim and Gangi, 2015). Commonly used teaching

<sup>2</sup>www.celcee.edu



methods are lectures, guest speakers and case studies adopted from textbooks (Sirelkhatim and Gangi, 2015; Fayolle and Gailly, 2008).

Teaching **for** entrepreneurship, on the other hand, implies the development of future entrepreneurs with practice-oriented education approaches. The educational goals are the development of specific theoretical knowledge and skills needed to start, develop, and successfully continue a venture project (Lackeus, 2015; Hytti et al., 2010). Moreover, it aims to encourage students and enhance their intentions to become future entrepreneurs (Sirelkhatim and Gangi, 2015). This teaching approach addresses the following topics: Generating ideas, team building, business planning, creativity, innovation, inspiration, opportunity recognition, selling, networking, unpredictable and contingent nature of entrepreneurship, adapting to change, and expecting and embracing failure (ibid).

Teaching **through** entrepreneurship includes an experience-based teaching approach, involving students in the venture development and learning process. Objectives and instructional designs in both teaching approaches *for* and *through* may overlap. However, teaching through entrepreneurship is focused on learning with and through real-life projects and entrepreneurs (Sirelkhatim and Gangi, 2015). The approach aims to involve students in existing venture creation processes, create their projects, and learning by doing.

An in-depth research on entrepreneurship programs and their objectives has been made by Samwel Mwasalwiba (2010), Lackeus (2015), Hytti and O’Gorman (2004) and Sirelkhatim and Gangi (2015). In his review, Samwel Mwasalwiba (2010) reviewed 20 articles with the focus on the definitions and objectives of entrepreneurship education. He found out that at that time, 32 per cent of the reviewed articles aimed at influencing attitudes, behavior, values or entrepreneurial intentions. Moreover, he distilled four general objectives of entrepreneurship education: Start-up & job creation, contribution to society, stimulate entrepreneurial skills, and increasing entrepreneurial spirit, culture and attitudes. It is a notable fact however, that the main focus of the programs analyzed by Samwel Mwasalwiba (2010) was on the development of entrepreneurial spirit, culture and attitudes and not on the stimulation and development of entrepreneurial skills. Also Hills (1988) found out, that according to the perceptions of leading entrepreneurship educators, the overriding educational objective is to increase students’ awareness and understanding of the new venture initiation process.

Hytti (2002) analyzed 171 literature references and 60 enterprise education programs or initiatives run in five European countries in order to identify what aims and objectives enterprise education programs explicitly or implicitly were trying to achieve. Based on the analysis, the authors identified the following three sets of enterprise education program aims that can co-exist in one particular program or course: I) Learn to understand entrepreneurship: What entrepreneurs do? What is entrepreneurship? Why are entrepreneurs needed? How many entrepreneurs do we have? II) Learn to become entrepreneurial: I need to take

responsibility of my learning, career and life. How to do it? III) Learn to become an entrepreneur: Can I become an entrepreneur? How to become an entrepreneur? How to manage the business?

Another attempt to identify the impact of EE on a range of entrepreneurial outcomes was made by (Nabi et al., 2017). The authors analyzed 159 articles published between 2004 and 2016. They found that research on EE impact "still predominantly focuses on measurements of short-term and subjective outcomes and tends to severely under describe the actual pedagogies currently being tested." The authors recommend directions for future research in entrepreneurship education. This includes the use of novel impact indicators related to emotion and mind-set, intention-to-behavior transition, and exploring the reasons for some contradictory findings in impact studies including person-, context-, and pedagogical model-specific moderators.

In their study, the authors Aparicio et al. (2019) identified main themes and topics associated with entrepreneurship education. They found out that the EE was a unique research theme during 1987- 2007. From 2008- 2017 however, related topics included entrepreneurship learning, entrepreneurship intention, higher education, and provocation. According to Hytti (2002), the alignment of entrepreneurship program objectives, student needs and the pedagogical intervention is still a great challenge in entrepreneurship education. Also, Fiet (2001) analyzed 18 syllabi on entrepreneurship education identifying 116 topics. Only one third of the topics overlapped. The author describes the challenges in the following statement (Fiet, 2001, p. 3):

*"These differences in course content were surprising considering that each respondent specializes in teaching entrepreneurship. As a group, either we did not agree on a paradigm for teaching entrepreneurship or perhaps we are searching for one. The content of our courses varies so much that it was difficult to detect if they even have a common purpose"*

However, he distilled the leading topical coverage areas presented below. Analyzing the origin of the topics covered in the entrepreneurship courses, the author points out that they represent subjects from other disciplines, not representing entrepreneurship as a specific domain. The areas and their disciplines are listed below in the order of their emphasis in the 18 syllabi:

Another Systematic Literature Review was conducted by Sirelkhatim and Gangi (2015). The authors analyzed 97 articles from the UK, USA, Europe, Australia, Asia, Africa and Latin America and found out that most articles discussed the curricula content and teaching methods that were used in practical-oriented course settings *for* entrepreneurship. A compilation of general EE objectives is presented in table 2.10.

Topic	Origin of the topic
Strategy/ Competitive analysis	Strategy/ Industrial organization
Managing growth	Small business management, organization theory, management literature
Discovery/idea generation	Entrepreneurship specific domain
Risk and rationality	finance and economic
Financing (mainly business angels)	finance and economic
Creativity	Psychology

Table 2.9: Leading topical areas in 18 syllabi analyzed and depicted by Fiet (2001, p. 3).

In her cross-sectional study, Küttim et al. (2014) analyzed the presence of educational offerings in 17 European efficiency- and innovation-driven countries. She found out that higher education institutions are offering three basic types of entrepreneurship education: I) Lectures and seminars about topics of entrepreneurship, II) networking and coaching opportunities and III) resources for founders and entrepreneurs. Fig. 2.5 presents the university EE offerings. Moreover, fig. 2.6 illustrates students' demand of university offerings.

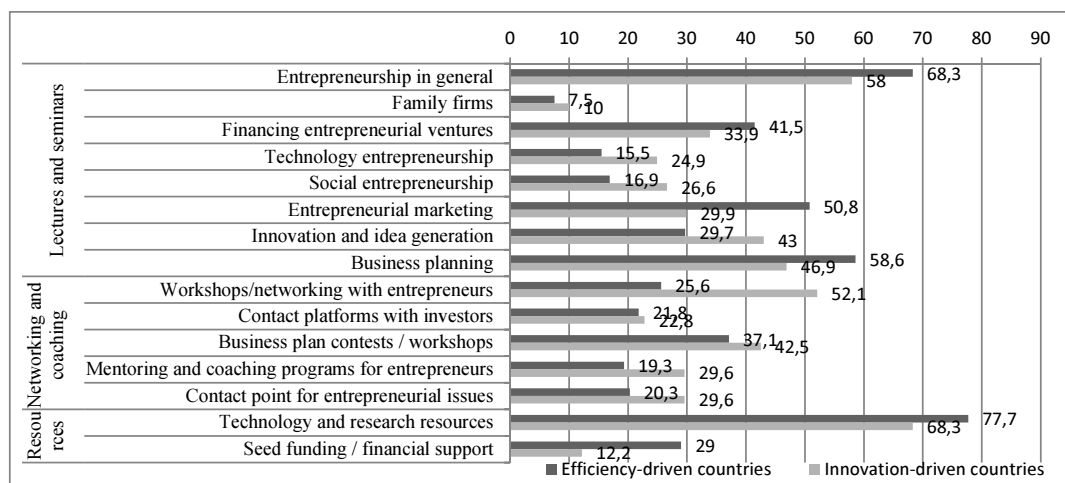


Figure 2.5: University offerings, % of "yes, there is such an offering" answers. Source: Küttim et al. (2014, p. 661)

### 2.4.3 Teaching methods

While it is generally acknowledged, that entrepreneurship can be taught, still many different opinions on the appropriateness of the teaching methods exist. Learning processes can be developed and designed in many different ways referring to the well elaborated learning outcomes of the target group. Moreover, the needs of the learner shape the nature and

Table 2.10: Objectives of Entrepreneurship Education

Author	Objectives
Garavan and O Cinneide (1994, p. 5)	<p>To create or increase entrepreneurial attitudes, spirit, and culture among students and the general community</p> <p>To contribute to new venture and job creation</p> <p>To contribute to the local entrepreneurial community</p> <p>To develop entrepreneurial skills</p> <p>To acquire knowledge germane to entrepreneurship</p> <p>To acquire skills in the use of techniques, in the analysis of business situations, and in the synthesis of action plans</p> <p>To identify and stimulate entrepreneurial drive, talent and skills</p> <p>To undo the risk-averse bias of many analytical techniques</p> <p>To develop empathy and support for all unique aspects of entrepreneurship</p> <p>To devise attitudes towards change</p> <p>To encourage new start-ups and other entrepreneurial ventures</p>

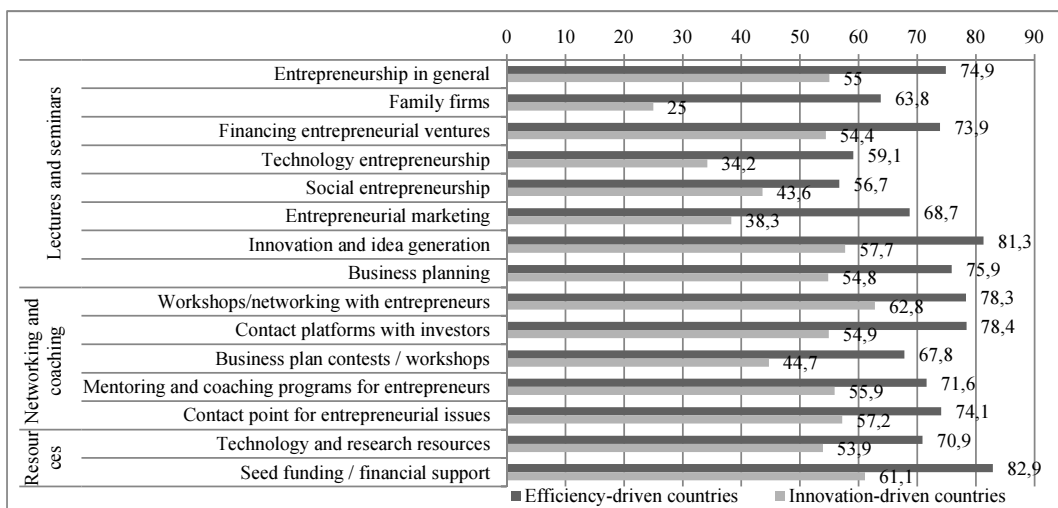


Figure 2.6: Students' demand of university offerings, % of "yes, I would like it" answers. Source: Küttim et al. (2014, p. 662)

requirements of the education delivery process, and in turn, the learning process determines the level of students' learning experience and engagement (Jones and English, 2004).

Entrepreneurship education is frequently associated with practice-oriented and student-centered teaching approaches, such as learning- by-doing or experiential learning. However, in her study, Hytti (2002), analyzed the teaching methods of 60 European entrepreneurship education programs and found out that over half of the programs made still use of traditional teaching methods. To prepare students to start-up their own companies, simulation methods (34 programs) or the actual setting up of business in the programs (20 programs) were used in the curriculum: "Traditional" teaching methods (36 programs), Business simulation (34 programs), Workshops (26 programs), Mentoring (22 programs), Study visits (18 programs), Setting up a business (20 programs), Games and competitions (9 programs), Practical training (9 programs).

Analyzing entrepreneurship education courses at 270 colleges and universities in the USA in 2004-2005, Solomon (2007) found out the most frequently used teaching methods were discussions, business plan creation, introduction of guest speakers and case studies. The authors note that traditional pedagogy and teaching methods using the business plan development as a foundation in entrepreneurship education still exist. However, there is a shift from lecture based teaching to a collaborative and interactive approaches such as discussions and guest speakers. Lackeus (2015) presents teaching methods, that are appropriate for entrepreneurship education: problem-based learning, project-based learning, service-learning. Addressing the question which teaching methods are appropriate for entrepreneurship education, San Tan and Ng (2006) analyzed successful models of entrepreneurship education at reputable business schools and reviewed the program curricula of Babson College, Stanford Graduate School of Business, MIT Sloan School of Management and the London Business School. As a result he found out, that most of the successful programs encompass learning-by-doing elements that were supported by outside-the-classroom activities such as internships with startups, creating and running small ventures on campus and working on small consulting jobs. Moreover, the development of business plans was a prominent program component in all programs, encouraging the learning-by-doing approach.

Project-based learning is a teaching and learning approach that is designed to engage students in investigation of authentic problems. It is described as engaging students to work on a authentic problem and create an artifact addressing the problem, i.e. a final product such as a report, a model, a video etc.(Blumenfeld et al., 1991). Problem-based learning on the other hand is characterized by the following criteria developed by Adderley et al. (1975) (cited in Helle et al. (2006, p. 288)):

- Projects involve the solution of a problem; often, though not necessarily, set by the student himself or herself;

- They involve initiative by the student or group of students, and necessitate a variety of educational activities;
- They commonly result in an end product (e.g., thesis, report, design plans, computer programme and model);
- work often goes on for a considerable length of time;
- Teaching staff are involved in an advisory, rather than authoritarian, role at any or all of the stages - initiation, conduct and conclusion.

In 1987 Gibb (1987, p. 19) suggested learning and teaching styles that need to be implemented in entrepreneurship education:

- Learning by doing - gaining insight as well as knowledge by involving students in problem solving in real-world situations right up to, and through, the solution and action component;
- Encouraging students to find and explore the wider concepts relating to a problem (starting from the problem) from a multi-disciplinary viewpoint;
- Helping students become accustomed to using immediate data, personally generated, and judging the use of this, together with more impersonal information;
- Helping students to develop more independence from external sources of information and expert advice, and to think for themselves - thus giving ownership of learning;
- Helping the students by this means to develop emotional responses to dealing with conflict situations, and encouraging them to make choices and commitments to actions in conditions of stress and uncertainty;
- Providing greater opportunity for the building up of networks and contacts in the outside world linked with their learning focus;
- Providing students with more flexible opportunities to learn in terms of timing and location;
- Providing more role models of successful use of learning in practice;
- Encouraging opportunities to learn by overcoming failure, and
- Encouraging use of feelings, attitudes and values outside of information. This, in general, will place greater emphasis on experience-based learning.

#### 2.4.4 Assessment and evaluation methods

Quality assessment has an important role in education and allows educators to foster and support student learning and improve educational programs. However, little research exists on the evaluation of student learning (Purzer et al., 2016). As mentioned above, the field of entrepreneurship education is fragmented in its learning and education objectives, teaching methods, target groups and contents. As a result, it is difficult to find and develop appropriate general evaluation approaches for EE programs (Hytti, 2002; Duval-Couetil et al., 2010). Instead, the methods for systematic and scientific evaluation should be aligned with the specific objectives of the course or program and can not be used for the measurement and evaluation of other courses with other objectives (ibid). Moreover, "as the acceptance of entrepreneurship courses and programs continue to diffuse worldwide, attention to effectiveness should grow accordingly" (Hills, 1988, p. 121).

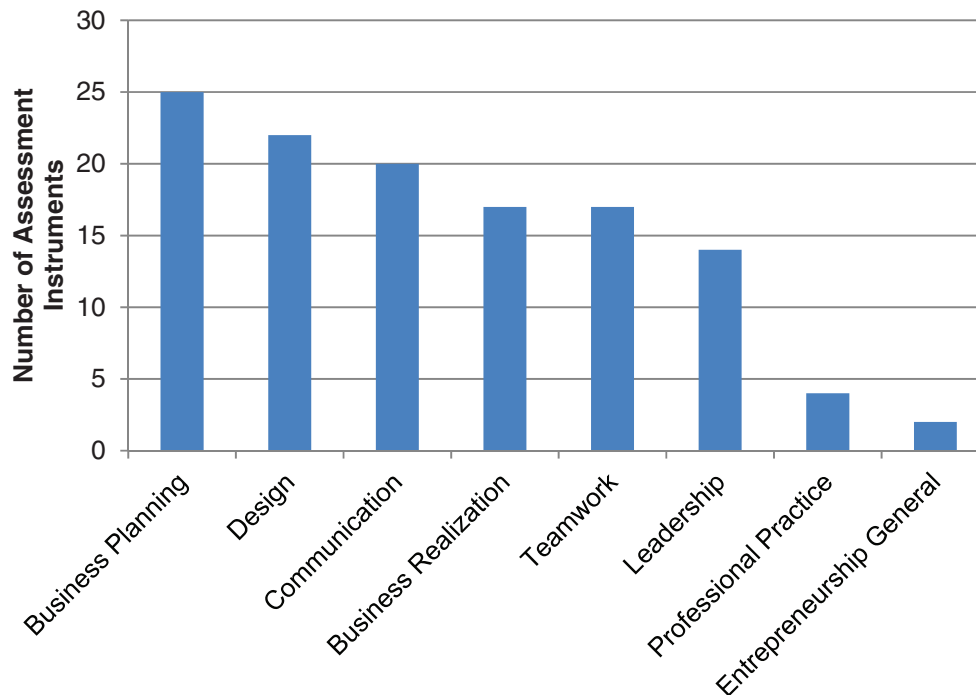


Figure 2.7: Frequency of Topics Assessed. Source: Purzer et al. (2016, p. 10)

In their literature review on current assessment methods in engineering entrepreneurship education, Purzer et al. (2016) identified 29 journal articles and 52 assessment instruments. The authors found out that besides design and communication, business planning was the most frequently assessed topic (48% of assessment instruments). Figure 2.8 presents the frequency of topics assessed. Moreover, the authors identified knowledge, skills and attitudes as the dimensions assessed in the literature. The majority (65%) of the instruments focused on skill assessment, 29% addressed attitudes and 21% assessed entrepreneurial knowledge.

These differences may result from the focus on project deliverables and self-report surveys, which tended to favour skill assessment (ibid).

Fig. 2.8 presents the distribution of entrepreneurship topics by assessment areas. It shows that some topics were assessed across multiple dimensions (knowledge, skills and attitudes), whereas some were limited in at least one dimension. Design and teamwork were rarely assessed in the knowledge dimension. Communication was frequently assessed as a dedicated skill. However, business-related aspects were assessed almost uniformly as knowledge, skills, and attitudes. However, of 52 assessment instruments identified by the study, only ten were coupled with direct validity evidence.

	Skill	Attitude	Knowledge
Business Planning	11	11	8
Business Realization	8	4	7
Design	14	7	3
Communication	18	3	2
Leadership	9	6	4
Professional Practice	2	1	2
Teamwork	14	4	2
Entrepreneurship General	0	2	0

Figure 2.8: Distribution of entrepreneurship topics by assessment areas. Source: Purzer et al. (2016, p. 12)

### 2.4.5 Critical challenges in entrepreneurship education

As one of the most influential authors in EE, Fayolle (2018, pp. 127) suggests two major evolutions for EE. First, "robust theoretical and conceptual foundations, drawing from the fields of entrepreneurship and education to support entrepreneurship programmes and courses. Secondly, we need to reflect upon our practices and take a more critical stance, breaking away from the far too common "taken for granted" position." Studying the literature reviews Fayolle (2018, pp. 132) revealed the following challenges in EE: Fragmentation, lack of theory, lack of critical approach, lack of legitimacy. Another critical issue is the heterogeneity in research methods and approaches, target groups and their regional and cultural characteristics. As a result, scholars report on positive and negative effects of entrepreneurship education (Oosterbeek et al., 2010, 2008; Fayolle and Gailly, 2008).



### 2.4.6 Effects of entrepreneurship education

The effects of entrepreneurship education have been the subject of studies around the world in the last decades. Although many authors positively relate entrepreneurship education with entrepreneurial intentions, skills and motivation (Fayolle et al., 2006; Küttim et al., 2014; Din et al., 2016), empirical research has still yielded mixed results and some authors claim that the evidence is still not strong due to severe methodological limitations (Von Graevenitz et al., 2010). Using ex-ante and ex-post-survey responses, the authors Von Graevenitz et al. (2010) found out that after the "Business Planning" course at the Ludwig-Maximilians-Universität (LMU) in Munich, entrepreneurial intentions declined. However, the course significantly positively affects students' self-assessed entrepreneurial skills. A similar effect is observed by Oosterbeek et al. (2010). The main methodological challenges in entrepreneurship education research may refer to the differences in course design, learning objectives, target groups and student populations, and the forms of interventions. In their study, Zhang et al. (2014b) identified significant positive interactive effects by variables such as gender, university type, and study major on the relationship between entrepreneurship education and entrepreneurial intentions. They identified a significant positive impact from entrepreneurship education on students' entrepreneurial intentions in *technical* universities. In addition to that, a recent study by Colombelli et al. (2022) confirms that entrepreneurship education positively effects entrepreneurial intentions of MSc students at a technology university.

In most entrepreneurship education courses that focus on "teaching for" or "teaching through" entrepreneurship, students develop business ideas, elaborate on business models and plans to operate the fictional company, and pitch their business visions to lecturers, potential stakeholders, and peers. As presented in Samwel Mwasalwiba (2010); Lackeus (2015); Sirelkhatim and Gangi (2015); Wan and Lv (2021), entrepreneurship education aims to increase entrepreneurial intention and foster entrepreneurial activities. Positive effects of entrepreneurship education on students' entrepreneurial intentions have been presented by Kim and Hong (2017); Zhang et al. (2014b); Galloway and Brown (2002); Gorman et al. (1997). Concerning specific characteristics of entrepreneurship education and the target group in technical universities, Zhang et al. (2014b) provide insights from ten different Chinese universities. In their study on the role of entrepreneurship education for students' entrepreneurial intention, the authors Zhang et al. (2014b) conclude that

*"For educators, policy makers and university management we would like to point at our finding on the interactive effects indicating that entrepreneurship education has a greater effect on EI for males than females, for students from technological universities than from other universities, and for students from technological majors than from other majors. These findings provide empirical*

*evidence to support entrepreneurship education in technological universities and majors. The traditional focus of entrepreneurship educational programs on business students should therefore be accompanied by more focus on entrepreneurship programs for engineering students." (Zhang et al., 2014b, p. 638)*

## 2.5 Intention Models

The intention is a latent, not direct observable psychological construct. Empirical research in entrepreneurial intentions has been established, conducted, and tested by Shapero and Sokol (1982); Liñán and Chen (2009); Liñán and Fayolle (2015); Van Gelderen et al. (2008a); Thompson (2009); Fayolle and Liñán (2014); Krueger Jr et al. (2000); Krueger (2008). In the literature, however, there is a certain lack of clarity in the use of the terms motivation, goals and intentions. Sometimes these terms are used synonymously or at least similarly. The only thing they have in common, however, is that they all have an influence on actions. In their systematic literature review on entrepreneurial intentions, Liñán and Fayolle (2015) identified 409 papers addressing entrepreneurial intentions between 2004 - 2013. According to the authors, the most cited paper on entrepreneurial intention models are Zhao et al. (2005); Liñán and Chen (2009); Hmieleski and Corbett (2006); Thompson (2009); Van Gelderen et al. (2008b). One of the reasons for the popularity of entrepreneurial intentions in entrepreneurship research is that intentions are considered the best single predictor of human behavior and, therefore, for entrepreneurial activities (Krueger, 2008; Ajzen, 1985; Shapero and Sokol, 1982). Two influential intention models have been developed in the entrepreneurship domain and are used to predict entrepreneurial intentions. The models are represented by the Theory of Planned Behavior (TPB) by Ajzen (1991), and by the Entrepreneurial Event Model by Shapero and Sokol (1982). Ajzen (1991, p. 181) presents a definition of an intention and their role for human behavior:

*"Intentions are assumed to capture the motivational factors that influence a behavior; they are indications of how hard people are willing to try, of how much of an effort they are planning to exert, in order to perform the behavior. As a general rule, the stronger the intention to engage in a behavior, the more likely should be its performance"*

In addition, behavior performance also depends on non-motivational and external factors, such as time, money, age, and skills (Ajzen, 1991, 1985). Many definitions can be found for entrepreneurial intentions: Fishbein and Ajzen (1975, p. 288) in Krueger (2008) define behavioral intentions as "a measure of the strength of one's intention to perform a specified

behavior." In the entrepreneurship literature, entrepreneurial intentions are often used to refer to a conscious goal to become an entrepreneur (Wilson et al., 2007). A profound analysis of the entrepreneurial intent literature can be found in Thompson (2009). After a reflection on different aspects of the terms "Entrepreneurial" and "Intention", he defines it "as a self-acknowledged conviction by a person that they intend to set up a new business venture and consciously plan to do so at some point in the future" (p. 676). Items and scales for entrepreneurial intentions have been developed, empirically validated and used to measure students' entrepreneurial intentions in entrepreneurship education by Liñán and Chen (2006, 2009); Autio et al. (2001); Shapero and Sokol (1982); Ajzen (1991); Thompson (2009); Krueger Jr et al. (2000). Different scales and items have been developed over time. To give an impression of the respective questions to measure entrepreneurial intentions, table B.1 in the appendix (section B) presents commonly used items of the authors. A prominent and accessible source to identify validated items and scales on entrepreneurial intentions has been developed by Liñán and Chen (2009). The authors develop and test an instrument to measure the entrepreneurial intentions in a cross cultural sample. The specific items to measure entrepreneurial intentions on a 7-point Likert scale (1: total disagreement to 7: total agreement) are:

- I am ready to do anything to be an entrepreneur
- My professional goal is to become an entrepreneur
- I will make every effort to start and run my own firm
- I am determined to create a firm in the future
- I have very seriously thought of starting a firm
- I have the firm intention to start a firm some day

However, it is questionable if these items are appropriate to apply to students in their Bachelor's or even in their early Master's studies. Young students may not have a clear understanding of their future career choices and their professional life in their early stage of their studies. In fact, to many of them, entrepreneurship as a career option may be new or even unfamiliar. The decision to become an entrepreneur has a variety of variables (e.g., social context, cultures, communities, age, gender, prior experience, personality traits, business idea, (labor) market conditions etc). Entrepreneurship education may have moderating effects on the different social antecedents of career intentions (Laspita et al., 2023). Students attending entrepreneurial courses may get in insight into the entrepreneurial arena, get familiar with key entrepreneurial tools and methods, and learn critical entrepreneurial skills. However, it is an open question if a positive response to the item "I am ready to do anything

to be an entrepreneur" or "I will make every effort to start and run my own firm" really reflects the reality and therefore, indicates the true entrepreneurial intentions to start a firm. Indeed, it raises the issue: Do we ask the right questions when trying to measure students' entrepreneurial intentions as a result of pedagogical interventions in entrepreneurship education? In the next sections, common theoretical frameworks to measure entrepreneurial intentions are presented and discussed.

### 2.5.1 Theory of Planned Behavior

In social science, the prediction of human behavior has a long history. Many concepts referring to behavioral dispositions, such as attitudes and personality traits, played an essential role in studying, predicting and explaining human behavior. However, general attitudes and personality traits have been proven to be poor predictors of behavior in specific situations (Ajzen, 1991). With its origin in social science, a well-validated and widely used model to predict behavioral intentions is the Theory of Planned Behavior (TPB) by Ajzen (1991). The model of TPB is presented in fig. 2.9. The model implies that three kinds of beliefs guide human behavior. I) behavioral beliefs: Beliefs about the potential consequences of the behavior, II) Normative beliefs: Normative expectations of and evaluation by other people, and III) Control beliefs: Beliefs about the presence of factors that will support or prevent successful performance of the behavior (Ajzen, 2002).

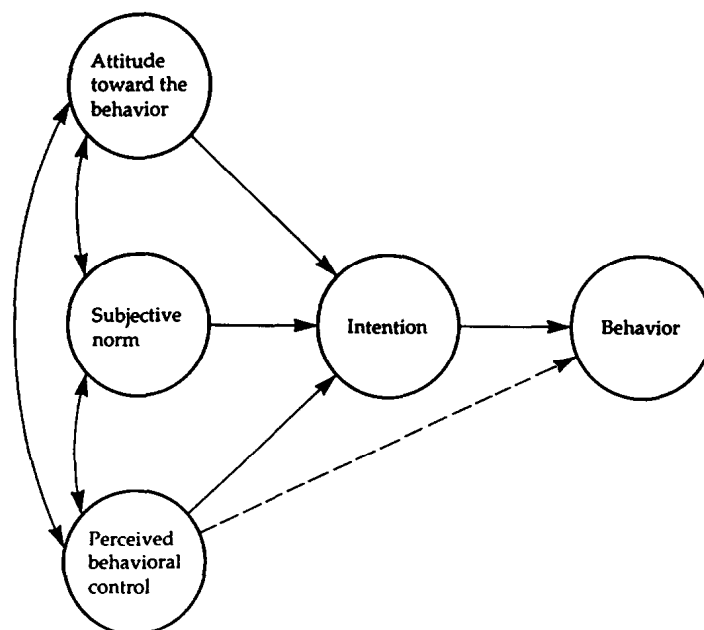


Figure 2.9: Theory of Planned Behavior. Source: (Ajzen, 1991, p. 182)

The following quote can be found in Ajzen (1991, pp. 181):

"Intentions are assumed to capture the motivational factors that influence a behavior; they are indications of how hard people are willing to try, of how much of an effort they are planning to exert, in order to perform the behavior. As a general rule, the stronger the intention to engage in a behavior, the more likely should be its performance. It should be clear, however, that a behavioral intention can find expression in behavior only if the behavior in question is under volitional control, i.e., if the person can decide at will to perform or not perform the behavior."

According to the TPB, three independent factors (antecedents) directly influence intention, which, in turn, predict behavior: Attitude towards the behavior, Subjective Norm, and Perceived Behavioral Control (see fig. 2.9). Higher values of the attitude towards the behavior, together with high values of the Subjective Norm, and Perceived behavioral Control, lead to a more robust individual's intention to perform the behavior under consideration (Ajzen, 1991).

### **Attitude Towards the behavior**

Ajzen (2005) describes attitudes as "latent" and "hypothetical" constructs that can be observed in people's responses in a given context. He defines an attitude as "a disposition to respond favourably or unfavorably to an object, person, institution, or event" (Ajzen, 2005, p. 3). The attitude towards the behavior "refers to the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question" (Ajzen, 1991, p. 188). It is similar to the desirability construct in Shapero and Sokol's model: it results from the subjective evaluation and importance of the action as well as from the expectations of the action, the potential subjective consequences, and the expected outcome of the action.

*An attitude is a bi-polar evaluative judgement of the object. It is essentially a subjective judgement that one likes or dislikes the object, that it is good or bad, that he feels favourable or unfavourable toward it. The term 'object' is again used in a generic sense. One may have attitudes towards concepts, people, institutions, events, behaviors, outcomes, etc." (Otway and Fishbein, 1976, p. 2).*

The role of attitudes in the formation of intention and behavior is crucial. In empirical studies, it has been shown that there is a strong positive association between attitude and a purchase intention of individuals (Bredahl, 2001; Chen, 2007; Michaelidou and Hassan, 2010; Sreen et al., 2018). In light of the aforementioned issue of measuring intentions with items presented by Liñán and Chen (2009), the attitude construct could be a reasonable potential alternative to be applied in the educational setting in entrepreneurship education.

Standard explicit attitude scaling techniques evaluate a person's attitudes by measuring individual responses to a given attitude object (or subjects and events) which can be positive or negative (Ajzen, 2005). Attitudes can be measured by a direct assessment asking respondents to report on their attitudes towards an attitude object, and has been proven to be adequate (Ajzen, 2005). In his book "Attitudes, personality and behavior, Ajzen (2005) presents single-item and multiple-item measures used by authors for attitudes measurement. The following example questions and scales illustrate the attitude measurement approaches (see also a compilation of items in table B.6). A question to college students in Michigan on drinking age on a 7-point scale is formulated as follows:

Michigan's drinking age should be raised to 21  
agree \_\_\_\_\_ disagree

Single-item question to respondents about their attitudes towards homosexuals on a 10-point scale

Homosexuals are  
extremely likable \_\_\_\_\_ not at all likeable

As an alternative, a multiple-item measure for the same question could be used in the following as presented below. Responses can be scored from - 3 (negative side) and +3 (positive side). The sum over the four scales results in the measure of the respondent's attitude towards homosexuals:

Homosexuals are  
pleasant \_\_\_\_\_ unpleasant  
harmful \_\_\_\_\_ beneficial  
good \_\_\_\_\_ bad  
awful \_\_\_\_\_ nice

Another multi-item approach to the capital punishment attitude can be developed as follows:

Capital punishment is  
good \_\_\_\_\_ bad  
foolish \_\_\_\_\_ wise  
sick \_\_\_\_\_ healthy  
harmful \_\_\_\_\_ beneficial

A scale to measure attitudes toward reading was developed by Estes (1971) using a 7-point Likert scale (I strongly agree to I strongly disagree). Example items are "Reading is for learning but not for enjoyment"; "Money spent on books is well- spent"; "There is nothing to be gained from reading books"; "Books aren't usually good"; "Books are a bore"; . . . . Another example is the development of a scale to measure attitudes towards inclusive education by Wilczenski (1995). Using a 6-point scale, the author developed 16 items using extreme ratings 1= strongly disagree to 6 = strongly agree. Example items are: "Students who are shy and withdrawn should be in regular classes". "Students, who can not move without help from others should be in regular classes"; Students, whose academic achievement is 2 or more years below the other students in the grade should be in regular classes"; Students who are physically aggressive towards their peers should be in regular classes".

### **Subjective norm**

The construct "Subjective Norm" refers to the "perceived social pressure to perform or not to perform the behavior" (Ajzen, 1991, p. 188). Social norms refer to the social environment of the person and his or her attitude towards the action, i.e., the social pressure from parents, friends, and colleagues to act or not to act. However, evaluating the influence of the social environment is a perceived factor. Therefore, the environment is not defined by objective measures but is made up of a greater or lesser number of people, such as family, partners, friends, and colleagues, depending on the individual circumstances. Example items to measure social norms are presented in table 2.11.

### **Perceived Behavioral Control**

Perceived behavioral Control (PBC) "refers to people's perception of the ease or difficulty of performing the behavior of interest" (Ajzen, 1991, p. 183). By defining PBC, Ajzen (1991, 2002) acknowledges the similarity and compatibility of the concept to perceived self-efficacy by Bandura et al. (1977); Bandura (1982) which is "concerned with judgments of how well one can execute courses of action required to deal with prospective situations" (Bandura, 1982, p. 122). Perceived control over one's behavior is also based on the subjective assessment of whether a behavior is likely to be successful, i.e., whether the success of the action appears to be controllable from the actor's perspective and whether he has the necessary self-efficacy.

"It can be seen that perceived behavioral control and self-efficacy are quite similar: Both are concerned with perceived ability to perform a behavior (or sequence of behaviors) (...) To avoid misunderstandings, (...) the term "perceived

Items	Author
If I became an entrepreneur my family would consider it to be...	Autio et al. (2001)
If I became an entrepreneur my friends would consider it to be...	
If I became an entrepreneur other people close to me would consider it to be...	
<i>If you decided to create a firm, would people in your close environment approve of that decision? Indicate from 1 (total disapproval) to 7 (total approval).</i>	Liñán and Chen (2009)
Your close family	
Your friends	
Your colleagues	
Would family and friends want you to start your own business?" (scale: 0 to 100)	Krueger Jr et al. (2000)

Table 2.11: Items used to measure Subjective Norms by authors

behavioral control" should be read as "perceived control over performance of a behavior" (Ajzen, 2002, p. 668).

Moreover, it is essential to note that perceived (ease of) access to resources and the possession of opportunities are critical external factors that positively influence the perceived control over the behavior and its execution (Ajzen, 1991, 2002).

"Perceived self-efficacy refers to beliefs in one's own capabilities to organize and execute the courses of action required to produce given levels of attainments". (Bandura, 2000, p. 16)

For the illustration of the measures of PBC and Self-efficacy, an overview is compiled to present items used to measure both constructs (see tables B.2 and B.3 in section B).

## 2.5.2 Entrepreneurial Event Model

Specific to the domain of entrepreneurship, Shapero and Sokol (1982) presented another prominent yet not well-tested intention model (Krueger Jr et al., 2000). In their "entrepreneurial event" model, Shapero and Sokol address what makes people act as entrepreneurs and the individual triggering factors to give up their previous life and become entrepreneurs. Based on that, Shapero and Sokol deal with the intentional factors that lead



people to choose entrepreneurship as a career option. The authors identified important reasons to take entrepreneurial actions: initiating and triggering (entrepreneurial) events. Human behavior tends to be constant and inert unless a change-triggering moment occurs. Shapero and Sokol recognized that humans react to unfavourable events rather than positive ones. External factors such as war, displacement, or loss of employment had a powerful effect. According to Shapero and Sokol, concrete action is taken if the expected outcomes are perceived as desirable and feasible. In addition, the model includes the individual propensity to act. That factor explains why high desirability and perceived positive feasibility do not lead to an intention that sometimes results in action. Therefore, entrepreneurial intention is influenced by three main factors: the perception of desirability and feasibility and the propensity to act upon the best opportunities from a set of alternatives. The model is presented in fig. 2.10.

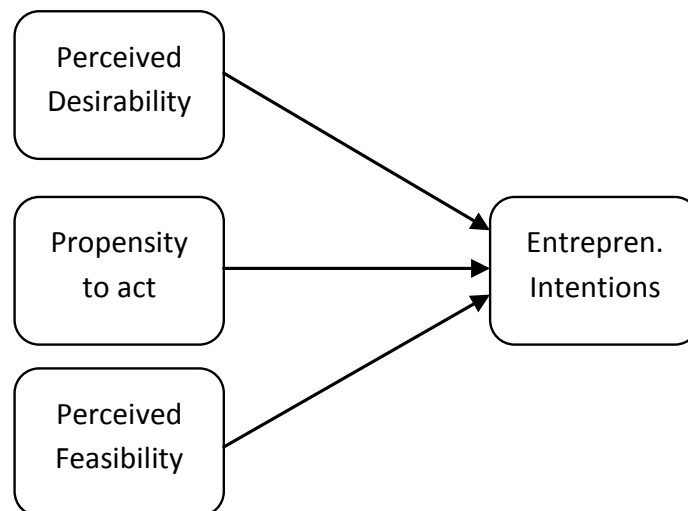


Figure 2.10: Entrepreneurial Event Model. Source: Shapero and Sokol (1982)

### **Perceived desirability**

As stated by Segal et al. (2005), the underlying conception of current intention models is that the intention to become an entrepreneur is predicted and determined by the following two questions (p. 45):

- Is entrepreneurship desirable to me? (i.e. does it lead to desired outcomes?); and
- Is entrepreneurship feasible for me? (i.e. do I have what it takes to succeed as an entrepreneur?).

In general, perceived desirability "refers to the degree to which a person feels an attraction towards a given behavior (to become an entrepreneur)" (Liñán, 2004, p. 4). In the specific context, desirability reflects the degree to which individuals value entrepreneurial behavior and find it attractive to become an entrepreneur (Krueger, 1993). Shapero is reported to define perceived desirability as "the personal attractiveness of starting a business" (Krueger Jr et al., 2000, p. 419). A measurement used in the entrepreneurial event model for Global Perceived Desirability is indicated in Krueger Jr et al. (2000):

*On a scale from 0 to 100, how desirable is it for you to start your own business?*

Specific Perceived Desirabilities are presented using four items from Shapero on 7-point scales (ibid):.

1. "I would love doing it" (I'd love doing it — I'd hate doing it)
2. "How tense would you be?" (very tense — not tense at all)
3. "How enthusiastic would you be?" (very enthused — very unenthusiastic)
4. "How overworked would you be?" (not at all overworked — extremely overworked)

Table B.4 presents a compilation of items used to measure the construct "Perceived Desirability".

### **Perceived feasibility**

Perceived feasibility is defined as "the degree to which one feels personally capable of starting a business" (Krueger Jr et al., 2000, p. 419). In Liñán (2004, p. 4) it is defined "as the degree to which people consider themselves personally able to carry out that behavior". The similarity and comparison between perceived feasibility and perceived self-efficacy will be discussed in the following sections. An example of global perceived feasibility measurement can be found in Krueger Jr et al. (2000):

*"How practical is it for you to start your own business?" (scale: 0 to 100)*

Thus, the constructs "Desirability" and "Feasibility" are crucial factors to form an entrepreneurial intention. Segal et al. (2005, p. 45) comes to a similar conclusion stating that

"an individual's intentions to become an entrepreneur are predicted by these two questions:

- Is entrepreneurship desirable to me? (i.e. does it lead to desired outcomes?); and
- Is entrepreneurship feasible for me? (i.e. do I have what it takes to succeed as an entrepreneur?)."

### 2.5.3 Comparison and synthesis of the intention models

The entrepreneurial event model and the Theory of Planned behavior have been the subject of two comparative studies by Krueger Jr et al. (2000) and Liñán (2004). In their studies, the authors compare the models' ability to predict entrepreneurial intentions and their statistical fit. Also, a compatibility test was made by Liñán (2004) who has shown that despite different underlying constructs used by the authors, the two models have much in common. A summary of the main findings in the comparative studies and their implications for the current study are presented below. Moreover, special attention will be paid to the terms and concepts used by Ajzen and Shapero and their compatibility.

#### Model comparison by Krüger (2000)

In their comparison study, Krueger Jr et al. (2000) concludes that both models are homogeneous to each other. In its original form, as described by Ajzen (1991), the intention has three independent antecedents. Interestingly, in Krüger's representation of Aizen's model, Perceived Behavior Control is replaced by the similar construct of Perceived Self-efficacy and indicated as an antecedent of perceived feasibility. Figure 2.12 illustrates the TPB model presented by Krüger together with the original construct PBC that Ajzen used. As a result, it seems that Krüger uses Perceived Self-Efficacy and Perceived behavioral Control interchangeably. The similarities of both constructs were identified by Ajzen (1991, 2002) and discussed above. The relation to the construct perceived feasibility, Krueger Jr et al. (2000) presents as follows:

*"Perceived behavioral control reflects the perceived feasibility of performing the behavior and is thus related to perceptions of situational competence (self-efficacy)." (p. 416).*

Moreover, Krüger states that Ajzen's construct "attitude towards the behavior" is a perception of the personal desirability used in the Entrepreneurial Event model by Shapero and Sokol (1982). This connection was also adapted by Liñán (2004) and is illustrated in figure 2.14. Moreover, Ajzen's attitude towards behavior and subjective norms are associated with and correspond with Shapero's perceived desirability in his entrepreneurial event model. This fact was also adapted by Liñán (2004).

As a result, both models showed solid statistical support and are homogeneous to one another (Krueger Jr et al., 2000). His statistical analysis showed significant but not complete support for the TPB. On the other hand, full support for the entrepreneurial event model with a marginally higher  $R^2$ . For the TPB, he reports the adjusted  $R^2$  for the regression of the factors: perceived feasibility, attitude towards the act and social norms upon intention with 0.350 ( $p < 0.0001$ ).

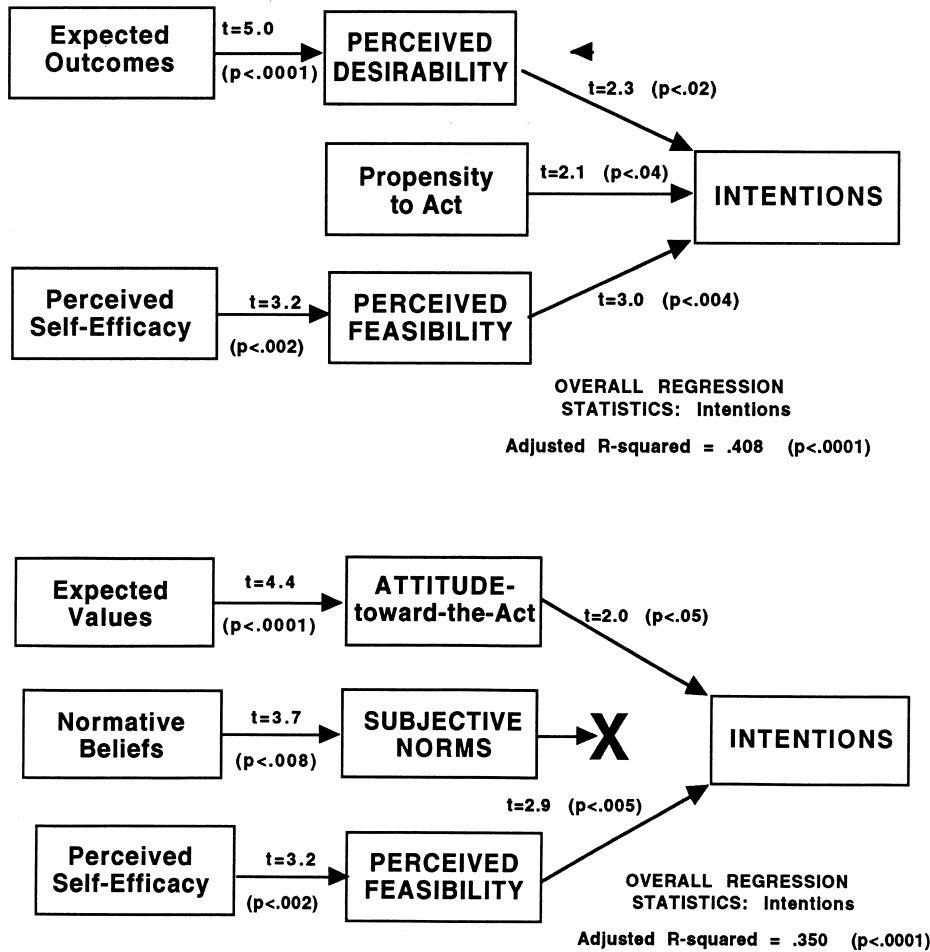


Figure 2.11: Statistical comparison of TPB and the Entrepreneurial Event Model Krueger Jr et al. (2000, pp. 423).

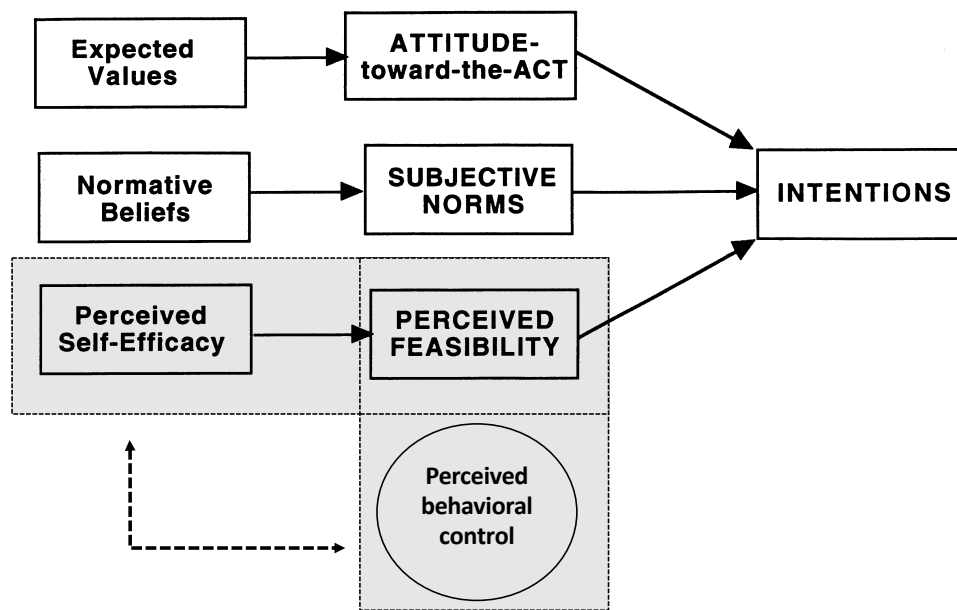


Figure 2.12: Theory of planned behavior presented in Krueger Jr et al. (2000, p. 416). Own modification.

*Intentions were predicted significantly by global perceived feasibility ( $p < 0.005$ ) and attitude toward the act ( $p < 0.05$ ). As expected, perceived feasibility represented a stronger influence on intentions. Each attitude measure was associated significantly with theorized antecedents, including the relationship between social norms and its predicted antecedent. Perceived feasibility was correlated with self-efficacy ( $R^2 = 0.100$ ,  $p < 0.002$ ). Attitude toward the act was correlated with expected utilities ( $R^2 = 0.189$ ). Social norms were correlated with normative beliefs weighted by motive to comply ( $R^2 = 0.171$ ,  $p < 0.008$ ) (Krueger Jr et al., 2000, p. 423).*

For the Entrepreneurial Event Model Krüger reports:

*The adjusted  $R^2$  for the regression of global perceived feasibility, global perceived desirability, and propensity to act upon intentions was 0.408 ( $p < 0.0001$ ). Every relationship predicted by the model was significant ( $p < 0.05$  or better) in the expected direction. Intentions were correlated significantly with global perceived feasibility ( $p < 0.004$ ) and global perceived desirability ( $p < 0.005$ ) (Krueger Jr et al., 2000, p. 423).*

### **Synthesis by Linan (2004)**

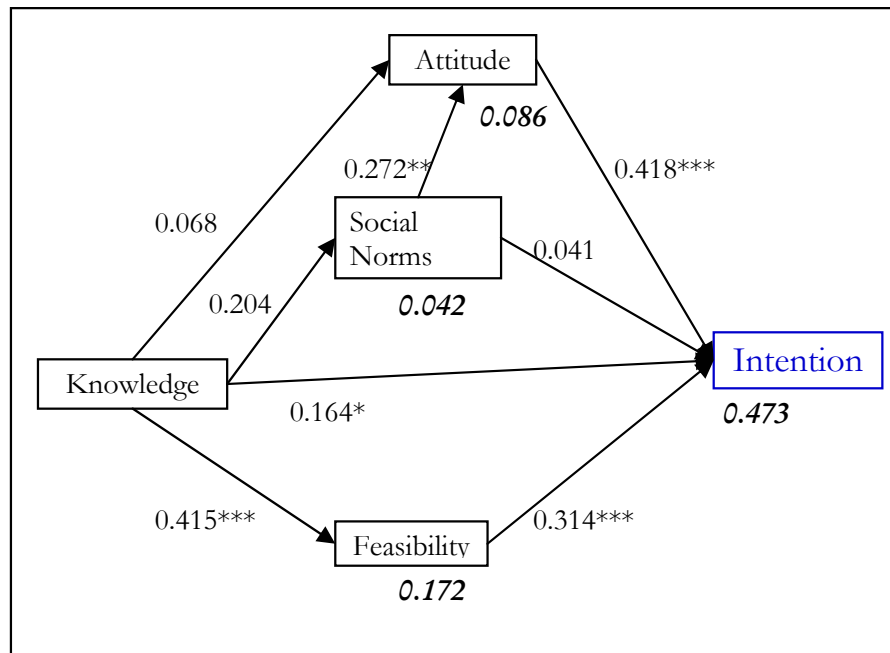
Four years later, Liñán (2004) analyses intention-based models in an entrepreneurship educational context for their validity. In particular, he shows that intention models explain and predict intentions better than external or demographic variables such as study degree, gender, Socioeconomic level, the reason for studies, age, and work experience. Analysing the intention models, he also relates the concepts "perceived behavioral control", "self-efficacy", and the "perceived feasibility" as presented in figure 2.14 and 2.12.

*"If we compare these explanatory variables with those considered by Shapero & Sokol (1982), we can see that perceived feasibility -as mentioned above- corresponds quite well with perceived behavioral control. On the other hand, the willingness to carry out that behavior (perceived desirability) could be understood as composed of the attitude towards it and subjective norms. In this sense, it may be recalled that Shapero & Sokol (1982) considered desirability as a result of social and cultural influences" (Liñán, 2004, pp. 6 ).*

Moreover, similar to Krueger Jr et al. (2000), he also found a low contribution of social norms to explain intention. A high correlation was found between attitude and feasibility. Interestingly, Linan found out that knowledge has a high relevance and direct influence not only on other antecedents of intention but also on intention itself. Especially, knowledge showed a significant influence (17.2 % of the variance) on perceived feasibility.

## **2.6 Opportunity recognition**

In the systematic literature review on entrepreneurial competences by Tittel and Terzidis (2020), opportunity recognition has been identified as one of the critical domain competences in entrepreneurship. Entrepreneurial opportunities are considered to be the key concepts for entrepreneurship. Influential authors claim that entrepreneurship starts with entrepreneurial opportunities (Shane and Venkataraman, 2000) and describe opportunity recognition as one of the main activities and key competences of entrepreneurs (Byers et al., 2011; Stevenson et al., 1989, pos. 497). In other words, "without opportunity, there is no entrepreneurship" (Short et al., 2010, p. 40). Moreover, policy studies and entrepreneurship research have constituted opportunity recognition as an essential entrepreneurial competence (Bacigalupo et al., 2016; Mitchelmore and Rowley, 2010). Asking 47 entrepreneurs and 22 scientists to rank a set of 13 entrepreneurial competences and traits, Riyanti et al. (2020) found out that "Seeking and utilizing opportunities" was among the top three on the respective list of entrepreneurs (rank three) and scientists (rank two). "Initiative" was ranked highest by both groups (rank one). Entrepreneurs indicated "perseverance" on the second rank and



\* Significant regression coefficients,  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .

Figure 2.13: Influence of internal variables on intention. Source: Liñán (2004, p. 27)

scientists on the third. Nonetheless, it is difficult to identify both a common framework of an entrepreneurial opportunity and a practice-oriented process to identify entrepreneurial opportunities in research and practice (Shane, 2003). In that sense, Gaglio and Katz (2001) point out that "understanding the opportunity identification process represents one of the core intellectual questions for the domain of entrepreneurship" (p. 95). Therefore, it is the question: What does it take to identify an entrepreneurial opportunity that will inspire and motivate the entrepreneur and the entrepreneurial team to take the initiative and foster perseverance in times of challenges?

In recent decades, interest in research on opportunity recognition has increased rapidly (Davidsson, 2015). An updated search in the Scopus database reveals the same result (see fig. 2.15), creating various views on entrepreneurial opportunities and opportunity recognition. In recent years, several Systematic Literature Reviews (SLRs) were developed to distil state of the art in the opportunity recognition domain (Short et al., 2010; George et al., 2016; Gumel, 2018; Filser et al., 2020; Davidsson, 2015). In addition, leading authors present latest views, research results and discuss critical concepts in the opportunity recognition domain in a Research Handbook on Entrepreneurial Opportunities by Léger-Jarniou and Tegtmeier (2017). Those sources represent and compile a profound knowledge base in the research field. As a result, authors present definitions, theoretical debates about the nature of opportunities, necessary conditions, and influencing factors in the field of opportunity recognition. The challenges and shortcomings in the opportunity recognition domain include

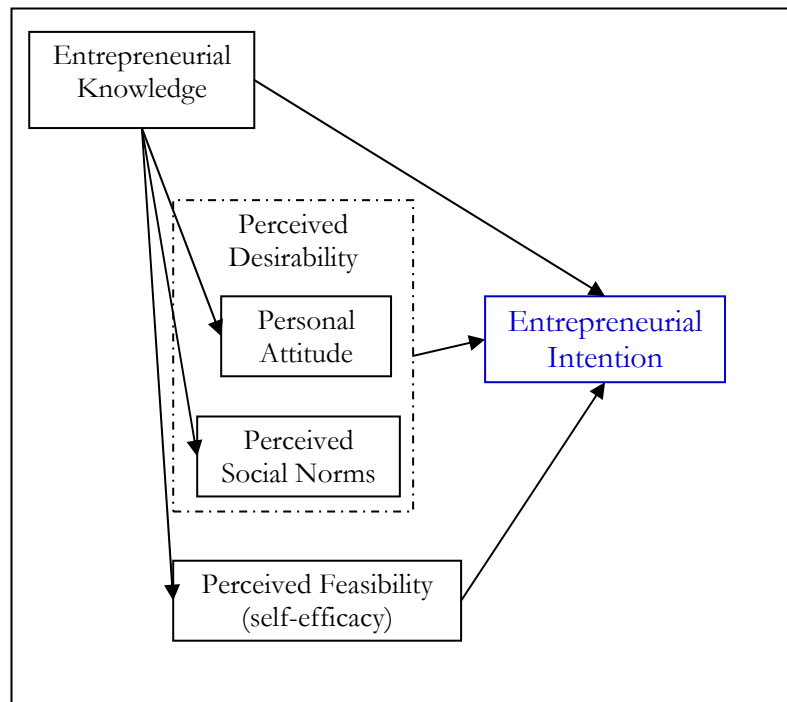


Figure 2.14: Integrated Entrepreneurial Intention Model. Source: Liñán (2004, p. 6)

a lack of an empirical sound definition, the operationalization of the concept, and the development of valid instruments for measuring and evaluating the opportunity recognition process. Therefore, the practical question "What should entrepreneurs do to identify valuable business opportunities?" remains open in research and practice. To address this question, state-of-the-art in the field of opportunity recognition is presented and discussed. The review and the literature analysis are motivated by the following guiding questions:

- How is an opportunity defined in the relevant literature?
- How is opportunity recognition defined in the literature?
- Which influencing factors are discussed in the literature?

It is a noticeable fact that the discovery, evaluation and exploitation of opportunities is a defining characteristic, and especially identifying opportunities is a key competence of entrepreneurs (Shane and Venkataraman, 2000; Ardichvili et al., 2003). Byers et al. (2011, pos. 497) describes opportunity recognition as one of the main activities of entrepreneurs: "Entrepreneurs identify opportunities, mobilize resources, execute on their vision and manage risks". In this regard, Shane and Venkataraman (2000) make a compelling argument that identifying and exploiting business opportunities is a unique challenge and process of entrepreneurship. From the research perspective Gaglio and Katz (2001, p. 95) point out that



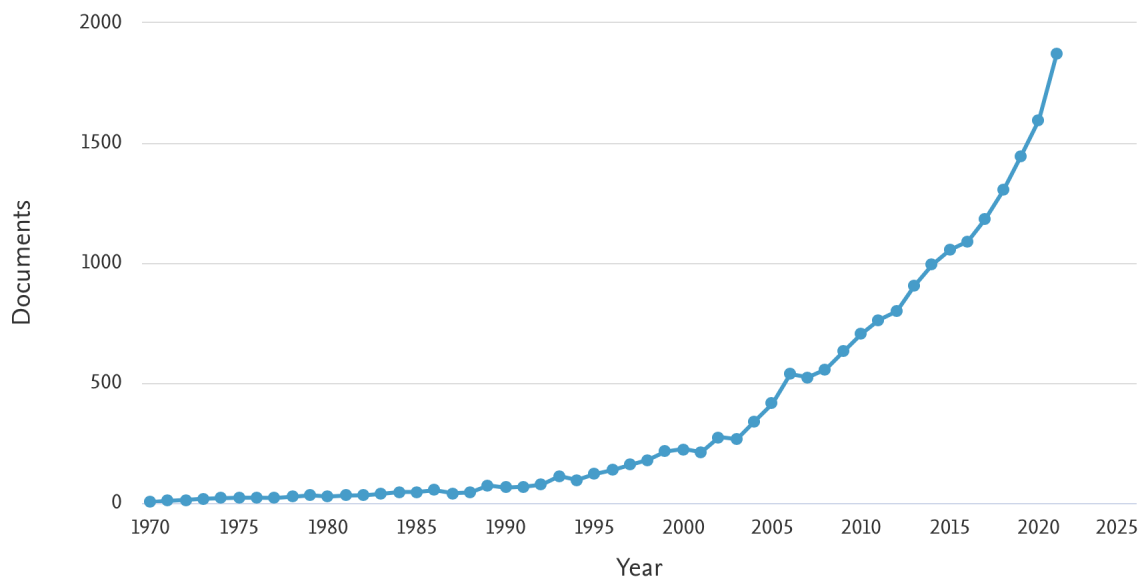


Figure 2.15: Opportunity recognition: Development of scientific publications. Time frame: 1970 - 2021. Source: Scopus bibliometric analysis

"understanding the opportunity identification process represents one of the core intellectual questions for the domain of entrepreneurship." Moreover, the identification and selection of opportunities are among others the most important abilities of successful entrepreneurs (Ardichvili et al., 2003; Stevenson et al., 1989). In addition to that, understanding the nature and characteristics of opportunities have a direct influence on the entrepreneurial process (Shane, 2003).

However, research also indicates relevant challenges. The challenges and shortcomings include a lack of an empirically sound definition of opportunity recognition and the characterization of opportunity recognition as a process. In his extensive review of definitions of entrepreneurial opportunities Hansen et al. (2011, pp. 290) found out that

*"(...) many conceptual papers failed to offer definitions and many empirical papers failed to clearly describe operationalizations or provide conceptual definitions".*

Scholars treat the process of opportunity recognition as a black box (Hansen et al., 2011). Due to the different views on definitions, approaches, and processes and the lack of conceptual clarity, it is difficult to compare results across studies and test current theories on opportunity recognition (Vogel, 2017). Gaglio and Katz (2001, p. 95) describe the situation in the following words:

*"Despite its importance to the theoretical advancement of the field, research regarding opportunity identification is in its infancy and is best characterized as*

*a scattering of descriptive studies rather than as a systematic research program of theory testing and development".*

Opportunity recognition as competence can be learned and developed in academic settings (DeTienne and Chandler, 2004). However, DeTienne and Chandler (2004) also highlight that opportunity recognition is not represented enough in the field of entrepreneurship education- neither as theoretical foundation nor as practical approach in academic settings. They raise the question of HOW or WHICH pedagogical methods would increase students' ability to identify opportunities. To define current research and critical insights into the field of opportunity recognition, three systematic literature reviews by George et al. (2016), Short et al. (2010), and Gumel (2018) and an extensive review of OR definitions by Hansen et al. (2011) were identified and are considered as the knowledge base for that domain. The systematic literature review by George et al. (2016) covers 1996-2011. In some details, it is a consequent continuation to Short et al. (2010), which period was open until 2010. In his study, Hansen et al. (2011) analyzed the work between 1990 and 2009. The guiding questions in the research field of opportunity recognition are associated with HOW, WHEN and WHY individuals can recognize opportunities whereas others cannot (George et al., 2016). Moreover, fundamental questions are WHAT FACTORS facilitate recognizing opportunities and why these factors play a significant role (Grégoire et al., 2010). However, in their extensive literature review on opportunity recognition, the authors George et al. (2016); Short et al. (2010); Hansen et al. (2011) conclude that the field of research on opportunity recognition is fragmented and empirically still underdeveloped. As a foundation of empirical insight into the research field, the main results of their work are presented and discussed in the following section. Their literature review includes and analyses 180 scientific publications from 1996 to 2011. To underline and deepen the insights into the field, updated literature resources are identified, and their results are embedded in the following discussion.

### **2.6.1 Main authors and definitions**

The papers "The promise of entrepreneurship as a field of research" by Shane and Venkataraman (2000) and "Prior Knowledge and the Discovery of Entrepreneurial Opportunities" by Shane (2000); Hansen et al. (2011) are identified as the most cited and influential contributions. Different definitions of "opportunity" and "opportunity recognition" were collected and analyzed to develop an in-depth understanding of the OR domain. In both publications, Shane refers to Casson (1982) and defines entrepreneurial opportunities as "those situations in which new goods, services, raw materials, and organizing methods can be introduced and sold at greater than their cost of production" (Shane and Venkataraman, 2000, p. 220). A harmonized definition of opportunity is not suggested in the literature, making it "a very

elusive concept" (Davidsson, 2015, p. 675). In order to get a broad perspective of different views and perceptions on opportunity recognition, relevant definitions were identified and are presented in table A.2. A helpful compilation of definitions can be found in Hansen et al. (2011) and Davidsson (2015). Their analysis reveals that in some articles, multiple definitions were found. Table A.2 presents a synthesis of both studies. Figure 2.16 illustrates the most productive contributions in opportunity recognition.

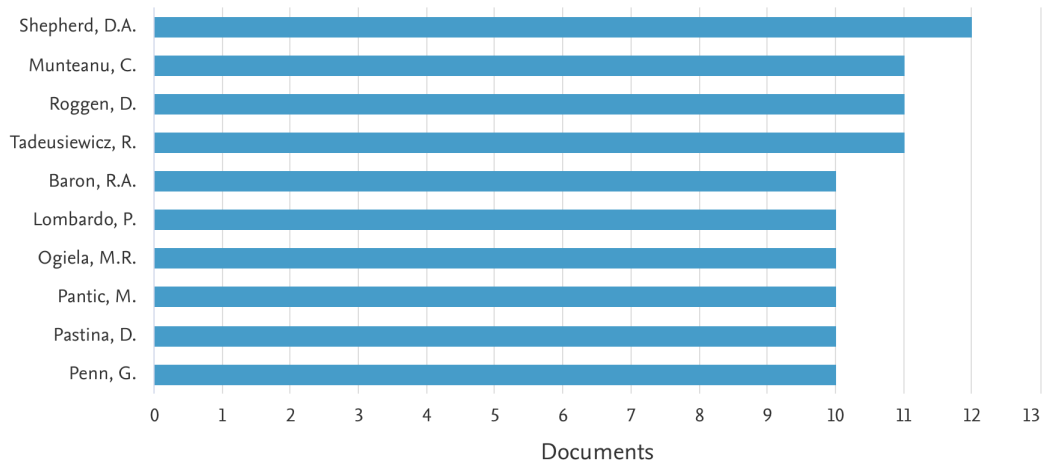


Figure 2.16: Most productive authors in the field of Opportunity Recognition. Time frame: 1970 - 2021. Source: Scopus bibliometric analysis

Shane (2003, p. 18) suggests a distinctive aspect of the entrepreneurial opportunity in contrast to other situations:

*"The main difference between an entrepreneurial opportunity and many other situations in which people seek profit is that at entrepreneurial opportunity requires a creation of a new means-ends framework rather than just optimizing within an old framework".*

The authors Hansen et al. (2011) analyzed critical elements of key definitions in the field of opportunity recognition. They found out that the terms "Entrepreneur", "Situation/external Environmental Conditions", "Possibility/Feasibility", "Product", "New/Novelty" and "New Business Form" were most mentioned terms (see table ). In addition, the following terms emerged in conceptual and operational definitions: "Cognitive Processes (Recognize, Perceive, Identify, etc.)" and "Market Need/Demand". In summary, opportunity recognition is a cognitive process of an entrepreneur that requires the critical analysis of external environmental conditions to find a market need and create a viable market offer for the customer.

## 2.6.2 Opportunity recognition, discovery, and creation

Entrepreneurs decide to create a new venture based on the belief that a unique and viable business opportunity has been created or identified (Léger-Jarniou and Tegtmeier, 2017). Whether opportunities are discovered or created is an ongoing debate among scholars resulting in two dominant but divergent views on opportunity recognition: opportunity discovery and opportunity creation theory. These views and their theoretical foundations are based on different "and often conflicting assumptions "from a wide range of disciplines, such as cognitive psychology and economics (Ardichvili et al., 2003, p. 107). Works of Schumpeter (1912) and Kirzner (1979) shaped the two schools of thought and received much attention in the entrepreneurship literature. Both theories aim to explain the opportunity recognition process. However, both theories differ in their views on the entrepreneur's role, the nature of opportunities, and the process of opportunity recognition (George et al., 2016). Based on the theoretical foundations, well-known work on opportunity recognition has been published by Shane and Venkataraman (2000) following Schumpeter's discovery theory and Baron (2006) following Kirzner's recognition theory. Moreover, a considerable contribution to the discussion of opportunity discovery, creation and recognition has been made by Sarasvathy et al. (2003). Sarasvathy et al. (2003) explain the differences between the key concepts ( Opportunity Recognition vs. Opportunity Discovery vs. Opportunity Creation) as follows: Opportunity recognition is described as the situation where both the product and the demand exist and an "opportunity for bringing them together" merely has to be "recognized" Sarasvathy et al. (2003, p. 145). In contrast, opportunity discovery, only one of the two – either the product or the demand – is already in existence, so that the other has to be "discovered" (ibid). In both cases, researchers believe that these opportunities are always existent in the market "like mountains, waiting to be discovered" (Alvarez and Barney, 2007, p. 11). In addition to that, a third term was coined, namely "opportunity creation", which refers to the situation where neither demand nor product exist (Sarasvathy et al., 2003, p. 145). In this case, it is the task of the entrepreneur to create both the new market need and the product to serve this need (ibid).

In the ongoing debate, an integrated view rather than one specific theory was discussed by authors (see, e.g. Gaglio and Katz (2001); Chiasson and Saunders (2005); Alvarez and Barney (2007)). The analysis of definitions by Hansen et al. (2011) reveals that the terms *recognition*, *identification* and *discovery* are used most often and they are used interchangeably. Further, Dimov (2007) identified research that classifies opportunity recognition either as "motivated search" or "serendipitous discovery". Shepherd and Patzelt (2018); Grégoire et al. (2010) argue that the debate about the philosophical nature of opportunities led the scholars to a "stalemate" that impedes research in this field.

*"Rather than focusing on the philosophical foundations of the nature of opportunities, it may be more beneficial to examine research suggesting that opportunities stem from changes, such as changes associated with new organizational or individual knowledge, changes in the actions of important players in the economy (e.g., customers, suppliers, competitors), or widespread changes in the macro-environment (e.g., new regulations, economic cycles)" (Shepherd and Patzelt, 2018, p. 26).*

Instead, Grégoire et al. (2010) suggest that opportunities arise from changes in the development of new knowledge by individuals and organizations or the changes in the social and economic environment (e.g., competitors, consumers, suppliers, institutions, market saturation, deregulation, business cycles, etc.). For that reason, the process of OR involves both an objective and a subjective dimension: The objective dimension is the context and reality of the environment, whereas the subjective dimension represents the cognitive processes (e.g. interpretation and connecting the dots) of individuals to find patterns and draw conclusions from the changes in the environment. In the following sections, theoretical views are characterized, and their underlying assumptions are discussed to understand the implications for the activities of entrepreneurs associated with these theories.

### **Discovery theory**

The discovery view is based on the work of Schumpeter (1912). Formed by exogenous changes in an industry, opportunities objectively exist in the markets (Alvarez and Barney, 2007). To illustrate the discovery view and contrast it to other theoretical approaches, Alvarez and Barney (2007) use a mountain climbing metaphor: People climb mountains because they are there. They exist and are a challenge for some climbers to achieve. The critical role of the entrepreneur is to discover and conquer those mountains (exploit opportunities). This emphasis suggests that the key activity of entrepreneurs is the systematic scanning of the environment to detect business opportunities (ibid). However, even if they see Mount Everest, not everyone can climb it. Thus, some people have specific characteristics, such as information asymmetries, risk preferences, and cognitive abilities, and others do not. Key characteristics identified in the literature are described in section 2.6.4 in detail.

### **Creation theory**

In contrast to the discovery theory, the creation theory assumes that opportunities do not exist in the markets. Instead, they are created endogenously by entrepreneurs driven by their beliefs (Alvarez and Barney, 2007). In other words, "opportunities are made, not found" (Ardichvili et al., 2003, p. 106). From the perspective of the creation theory,

entrepreneurs' actions and beliefs are essential factors for opportunity creation. Driven by beliefs, entrepreneurs interact with their environment, learn from their experience and adapt their beliefs to the outcomes of their actions (ibid). Both discovery and creation theory assume that the main goal of entrepreneurs is to form and exploit entrepreneurial opportunities. According to Short et al. (2010, p. 54), it is expected that the literature will move to a "middle ground" position where some opportunities are discovered whereas others are created.

<b>Domain</b>	<b>Discovery Context</b>	<b>Creation Context</b>
Leadership	Based on expertise and (perhaps) experience	Based on charisma
Decision Making	Risk-based data collection tools; Risk-based decision making tools; Importance of opportunity costs	Iterative, inductive, incremental decision making; Use of biases and heuristics; importance of affordable loss
Human Resource Practices	Recruitment: Specific human capital recruited broadly	Recruitment: General and flexible human capital recruited from preexisting social networks
Strategy	Relatively complete and unchanging	Emergent and changing
Finance	External capital sources: Banks and venture capital firms	'Bootstrapping' and 'friends, families, and fools'
Marketing	Changes in marketing mix may be how new opportunities manifest themselves	Marketing mix may fundamentally change as a result of new opportunities that emerge
Sustaining Competitive Advantages	Speed, secrecy, and erecting barriers to entry may sustain advantages	Tacit learning in path dependent process may sustain advantages

Table 2.12: Effective entrepreneurial actions in discovery and creation contexts. Alvarez and Barney (2007, p. 17)

<b>Nature of</b>	<b>Discovery Theory</b>	<b>Creation Theory</b>
Opportunities	Opportunities exist, independent of entrepreneurs. Applies a realist philosophy.	Opportunities do not exist independent of entrepreneurs. Applies an evolutionary realist philosophy.

*Continued on next page*

Table 2.13 – *continued from previous page*

Nature of	Discovery Theory	Creation Theory
Entrepreneurs	Differ in some important ways from non-entrepreneurs, ex ante.	May or may not differ from non-entrepreneurs, ex ante. Differences may emerge, ex post.
Decision Making Context	Risky	Uncertain

Table 2.13: Central assumptions of discovery and creation theories of entrepreneurial action. Source: Alvarez and Barney (2007, p. 13)

### 2.6.3 Opportunity Recognition Models

A variety of opportunity recognition models and frameworks has been developed to present and describe the underlying processes, factors and critical stages in identifying business opportunities. Some attempts have been made to find a clear definition of an opportunity recognition as a cognitive process. As described by Baron (2006, p. 107):

"(...) Opportunity recognition can, (...) be defined as the cognitive process (or processes) through which individuals conclude that they have identified an opportunity. It is important to note, as emphasized recently by several authors, that opportunity recognition is only the initial step in a continuing process, and is distinct both from detailed evaluation of the feasibility and potential economic value of identified opportunities and from active steps to develop them through new ventures."

Thus, opportunity recognition is only one, the first, step followed by the evaluation and exploitation of a business opportunity. In the recent literature, several process models have been developed. Some of the models are presented in the following section to get an impression of the key elements which need to be considered in the development of a practical opportunity recognition workshop

Using an inductive grounded theory approach and qualitative and quantitative data with entrepreneurs and managers, the authors Dyer et al. (2008) propose a theory to describe the distinctive behavioral patterns of innovative entrepreneurs and executives. As a result, they describe the main sources of information that are relevant for opportunity recognition performed by entrepreneurs Dyer et al. (2008, pp. 323):

- **Questioning:** Innovative Entrepreneurs were more likely to ask questions that challenged the status quo with a "if we did this, what would happen?" mindset. The questions asked by managers were much more about understanding how to make

existing processes (i.e., the status quo) work a little better. Openly questioning the strategy or key initiatives of the company, "could create a crises of confidence within the company" (p. 323).

- **Observing:** Observation skills are critical for entrepreneurs and innovators to foster and trigger new ideas. Entrepreneurs observe customers and processes and talk to experts to better understand the underlying patterns. Therefore, as pointed out by other studies, entrepreneurial alertness is a critical factor in that context (Gaglio and Katz, 2001; Kirzner, 1973).
- **Experimenting:** Active experimentation (e.g., mental or physical explorations) is the next key factor in generating novel information. "Compared to managers in large organizations, innovative entrepreneurs more frequently experiment and explore, particularly doing so with a hypothesis testing mindset." (p. 327)
- **Idea networking:** Entrepreneurs build and maintain their social and professional networks. These networks are have people with diverse experiences and perspectives used to challenge their entrepreneurs' point of view.

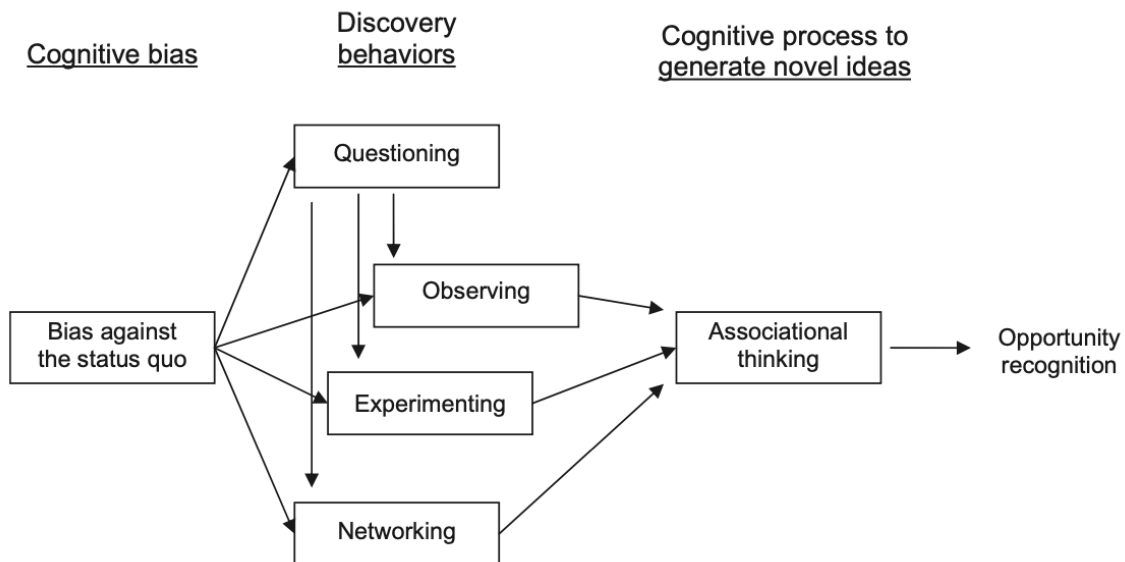


Figure 2.17: A model of entrepreneurial opportunity recognition. Source: Dyer et al. (2008, p. 334)

The results of the study suggest that information seeking behavior is a critical pattern and entrepreneurial skill to develop innovative business ideas. In addition to that, it fosters creativity by interconnecting the different information gathered by an intense observation.



Thus, Dyer et al. (2008) integrate the (social) processes and make them a focal point of their model (see fig. 2.17).

The second process model in the opportunity recognition domain is presented by (Ardichvili et al., 2003). Building on prior theoretical and empirical studies, the authors derived critical personality traits and other factors relevant to successful opportunity identification: Entrepreneurial alertness; information asymmetry and prior knowledge; social networks; optimism and self-efficacy, and creativity; and the type of opportunity itself. The author assign entrepreneurial alertness a special role and point out that it is "a necessary condition for the success of the opportunity identification" (p. 105). According to the authors, the opportunity recognition process includes the following steps: I) sensing or perceiving market needs and/or underemployed resources, II) recognizing or discovering a "fit" between particular market needs and specified resources, and III) creating a new "fit" between heretofore separate needs and resources in the form of a business concept (Ardichvili et al., 2003; Hills, 1995; De Koning and Muzyka, 1999). The major concepts are presented as opportunity, and opportunity recognition, development, and evaluation. As preconditions to start the discovery or creation process, specific personality traits, prior knowledge, social networks, and entrepreneurial alertness are vital. The core opportunity recognition process is iterative and consists of the discovery or the creation of a business opportunity, its development and evaluation (see fig. 2.18).

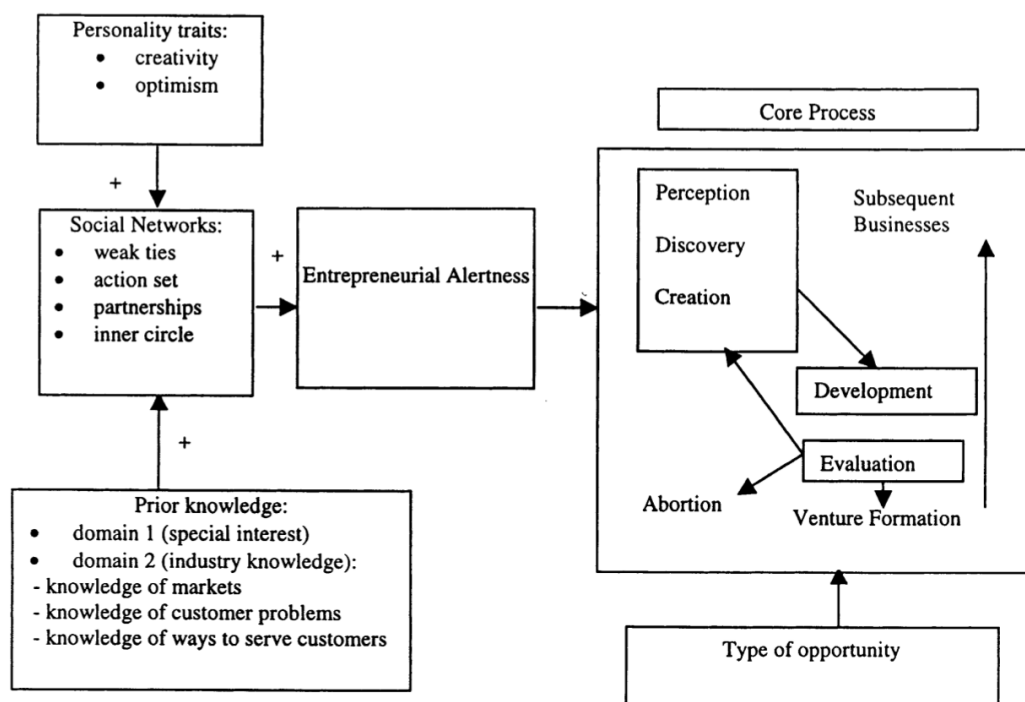


Figure 2.18: Model and units of the opportunity recognition and development theory. Source: Ardichvili et al. (2003, p. 118)

Focusing on unique entrepreneurial behavior and the vital factor of "entrepreneurial alertness", Gaglio and Katz (2001) have developed another model critical for opportunity recognition. Entrepreneurial alertness is the ability to notice “what might be around the corner” (Kirzner, 2009, p. 151). An entrepreneur can detect or observe an unusual or unexpected event by having entrepreneurial alertness at a given market situation or a specific event. Referring to the observations made by Dyer et al. (2008) above, the entrepreneur can start questioning the observed situation and the status quo as presented in fig. 2.19 ("What’s going on here?" and "how does it affect the industry" etc.). By decomposing the existing processes, questioning the status quo, and experimenting, the entrepreneur can identify existing patterns, rules and established Means-Ends Frameworks and recombine them into something new, resulting in innovative business opportunities. However, it is a noticeable fact that "(...) not all of those who demonstrate entrepreneurial alertness will be entrepreneurs" (Gaglio and Katz, 2001, p. 106). More individual factors play a decisive role in the decision to develop and exploit an entrepreneurial opportunity. Interestingly, the effect of alertness and a dedicated decision to question the status quo may lead to subsequent analytical processes associated with a market industry analysis. As presented in their alertness schema, the entrepreneur will analyse socio-political conditions, current competitors and state of the art in production processes, service and product offerings, customer needs etc.

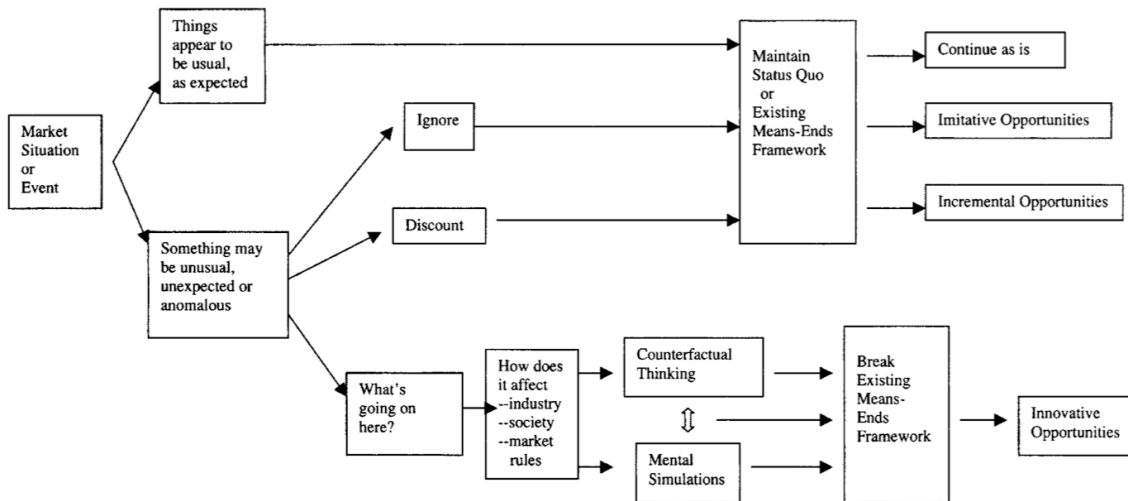


Figure 2.19: Alertness and the opportunity identification process. Source: Gaglio and Katz (2001, p. 99)

In their integrative framework of opportunity identification development and exploitation (OIDE), Peiris et al. (2015) propose a conceptual model to describe the opportunity recognition process and present its critical determinants and antecedents (see fig. 2.20). Those are: Access to resources, entrepreneurial capacity (consisting of prior knowledge,

creativity, self-efficacy and perseverance), social capital and Access to resources. Based on the work of Ardichvili et al. (2003), the authors describe the frameworks as an iterative learning cycle in which entrepreneurs use knowledge and entrepreneurial capabilities to create value and innovative business solutions. The factors "social capital" and the "access to tangible and intangible resources" are critical determinants to be considered in a pedagogical and academic setting and are therefore presented in more detail. In fact, as vital factors for entrepreneurs, Bachelor's or Master's students usually do not have a substantial professional network with managerial or industry experience. In addition, access to tangible (finance, infrastructure and machinery etc.) and intangible (e.g. specific profound competences, patents, copyrights) resources is often challenging or missing. It is therefore critical for entrepreneurship educators and trainers to find strategies to overcome that challenges. As presented by the OECD definition above, social capital is described as the network of people who share norms and the same values and foster collaboration and cooperation within and among groups. Effective teamwork and collaboration are of vital importance for entrepreneurial teams (De Carolis et al., 2009). As stated by Shepherd et al. (2021, p. 17)

"A founding team refers to a group of individuals who collectively create a venture. Founding teams have often varied experiences, are diverse in different attributes, sometimes have prior shared experience, and are influenced by structure."

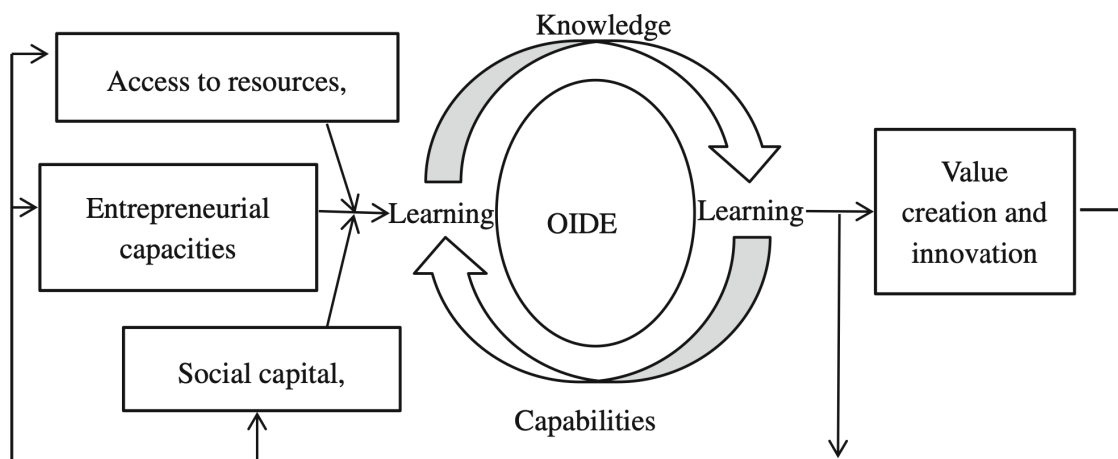


Figure 2.20: Opportunity Recognition Model. Source: Peiris et al. (2015, p. 197)

Analyzing, understanding, sharing and discussing individual attributes, prior experiences, norms and values and finding a set of shared values within a student team could be a first approach to meeting the challenge and raising awareness among students. Detailed configuration and pedagogical design will be presented and discussed in the following

chapters. Based on a profound literature and discourse review on opportunity recognition, George et al. (2016) develop and present a holistic view of the opportunity recognition process by analyzing 180 articles in the opportunity recognition domain. They identified six prominent factors influencing opportunity recognition: Prior knowledge, social capital, cognition/ personality traits, environmental conditions, alertness, and systematic search. Thus, the process presented in fig. 2.21 includes these critical factors. The systematic search, as well as the alertness of the entrepreneur towards business and environmental changes and incongruities, represent the antecedent factors. The recognition of a business opportunity includes the discovery and the creation view. As a result of processing and implementing the key factors (social capital, prior knowledge, cognition/personality traits, environmental conditions), a business opportunity is recognized. Based on that, it needs to be evaluated and analyzed before exploitation. Interestingly, that model includes key factors and components and suggests a three-step approach for an opportunity recognition process: I) Opportunity recognition, II) Analysis/Evaluation, and III) Exploitation.

Although multiple theoretical frameworks and models of the ORP exist, little research has been conducted to implement opportunity recognition practically. One existing practical tool is the Market Opportunity Navigator by Gruber et al. (2017). While it includes many essential aspects of OR, it neglects crucial aspects such as prior knowledge, which plays a vital role for young entrepreneurs. The lack of an effective method for the ORP that meets the requirements of young entrepreneurs can be another reason for young entrepreneurs' problems in finding suitable and new business opportunities.

Critical factors are presented and discussed in more detail in the following section to build a solid foundation for developing an opportunity recognition workshop.

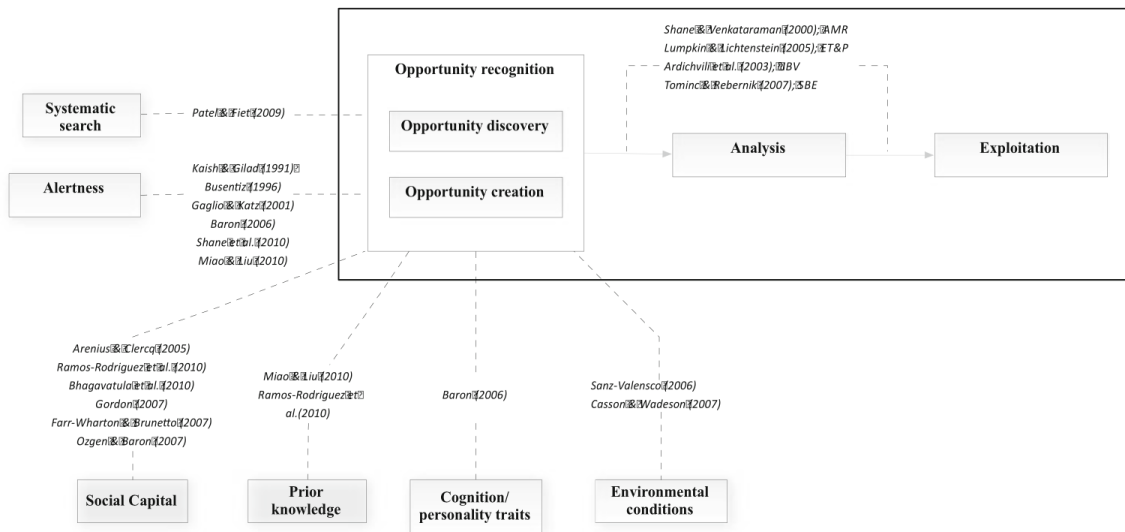


Figure 2.21: Opportunity Recognition Model. Source: George et al. (2016, p. 338)

### 2.6.4 Critical factors in opportunity recognition

In the academic literature, a broad range of factors has been studied to understand the process and the underlying characteristics of entrepreneurs who identify or create opportunities. Previous research shows that several factors positively affect exploring and exploiting opportunities. However, "only a few variables have been subjected to empirical validation in relation to opportunity identification" (Peiris et al., 2015, p. 198). The relevance of these factors and their implications for opportunity exploitation are illustrated in the notions by Choi and Shepherd (2004, p. 390):

1. Entrepreneurs who believe that customers will value their new product(s) are more likely to proceed with exploitation
2. Entrepreneurs who believe that they have the enabling technologies for full-scale operations are more likely to proceed with exploitation
3. Entrepreneurs who believe that they have a highly capable management team are more likely to proceed with exploitation
4. Entrepreneurs who believe that they have strong stakeholder support for full-scale operations are more likely to proceed with exploitation.

The critical factors identified in the literature reviews on OR are: Prior knowledge, social capital, cognition, environmental conditions, entrepreneurial alertness, and systematic search (George et al., 2016). A systematic overview is presented in table 2.14.

Factor	Filser et al. (2020)	Gumel (2018)	George et al. (2016)
Prior Knowledge	✓	✓	✓
Social Capital	✓	✓	✓
Personality Traits	✓	✓	✓
Alertness	✗	✓	✓
Experience	✓	✗	✗
Cognitive Processes	✓	✗	✗
Genetics	✓	✗	✗
Technology	✓	✗	✗
Organizational Aspects	✓	✗	✗
Type of opportunity	✗	✓	✗
Systematic Search	✗	✗	✓

*Continued on next page*

Table 2.14 – *continued from previous page*

Factor	Filser et al. (2020)	Gumel (2018)	George et al. (2016)
Environmental Factors	✘	✘	✓

Table 2.14: Influencing factors on opportunity recognition

**Prior knowledge**

Studies have shown that prior knowledge and business experience play a significant role in the OR process. Because knowledge is not uniformly distributed in society and people always have their individual experience, prior knowledge help to explain why some individuals can identify specific opportunities while others do not. Prior knowledge was defined as "the whole of a person’s knowledge. As such, prior knowledge is dynamic in nature; is available before a certain learning task; is structured; can exist in multiple states (i.e., declarative, procedural, and conditional knowledge); is both explicit and tacit in nature and contains conceptual and metacognitive knowledge components" (Dochy et al., 1996, p. 311).

According to economic scholars, different levels of prior knowledge result in the difference between the ability of some people to recognize opportunities (Venkataraman, 1997). Individuals hold different beliefs (lucky hunch, superior intuition, or private information) about the value of resources. It implies two key aspects of knowledge: (I) The information and beliefs asymmetry. II) the existence of specific prior knowledge of individuals about markets, prices of goods, existing products, production methods, user needs, new technologies, political and regulatory shifts, and the potential (re-) combination of these factors (Shane and Venkataraman, 2000; Shane, 2003). Kirzner (1997, p. 62) describes it as "mutual knowledge of potential demand and supply attitudes ". Moreover, in management science, knowledge is recognized as a source of competitive advantage (Probst et al., 1998; Barney, 1991). Knowledge is acquired by experience or (experimental) learning. Learning is a critical driver for opportunity recognition (Short et al., 2010). In their studies Ardichvili et al. (2003); Shepherd and DeTienne (2005) found out that the following types of knowledge have a better likelihood of recognizing opportunities: (1) special interest knowledge and general industry knowledge; (2) prior knowledge of markets; (3) prior knowledge of customer problems; and (4) prior knowledge of ways to serve markets. In addition, Shepherd and Patzelt (2018) highlight the importance of prior entrepreneurial knowledge.

Knowledge in the form of experience was investigated by Vesper (1980) in Corbett (2005). He found out that work experience was a decisive factor in opportunity recognition. Moreover, "The possession of the prior information necessary to identify an opportunity and (2) the cognitive properties necessary to value it" is why some people discover en-

trepreneurial opportunities. In contrast, others don't (Shane and Venkataraman, 2000, p. 222). In other words,

Applying the literature on prior knowledge to the recognition of opportunities, those with more prior knowledge (compared to those with less prior knowledge) will pay more attention to the most important aspects of the available information and will then process this information more efficiently, thus facilitating the recognition of more opportunities (Shepherd and Patzelt, 2018, p. 9).

Moreover, prior knowledge plays a vital role in the cognitive process of connecting the known with the unknown (Shepherd and Patzelt, 2018). The authors Cohen and Levinthal (1990) highlight the importance of knowledge for creativity and the development of innovative ideas:

*"The prior possession of relevant knowledge and skill is what gives rise to creativity, permitting the sorts of associations and linkages that may have never been considered before"* (p. 130).

### **Social Capital**

The OECD defines Social Capital as "networks together with shared norms, values and understandings that facilitate cooperation within or among groups" (OECD, 2001b, p. 41). The entrepreneur's social networks consist of four circles: "weak ties", the "action set", "partnership", and the "inner circle" (De Koning and Muzyka, 1999, p. 11). These four elements can be described as follows: First, the term "weak ties" refers to the set of people within the entrepreneur's interpersonal network with whom he "engages only in small-scale interactions" (Granovetter, 1973, p. 1360). Second, the "partnership" is described as the "uniquely close relationship between the two or more people who start a new enterprise" (De Koning and Muzyka, 1999, p. 13). Third, the "action set" refers to the people the entrepreneur recruits due to their usefulness ((De Koning and Muzyka, 1999, p. 13), which for instance can relate to technical or financial competences. Finally, the "inner circle" is the set of people with whom the entrepreneur has a "long-term, stable relationship" but who are usually not partners during his or her entrepreneurial ventures (De Koning and Muzyka, 1999, p. 12). Weak ties play an especially important role in opportunity recognition as they can be the source of more diverse information than the entrepreneur's closer social environment (Granovetter, 1973, p. 1370). Nevertheless, developing all four network circles is crucial for finding new opportunities (Ardichvili et al., 2003).

### **Cognition and personality traits**

Exploiting an entrepreneurial opportunity requires an entrepreneur who believes in the value of the opportunity. The possession of prior knowledge, business experience or other market insights per se does not automatically result in identifying and exploiting new business opportunities. Instead, this knowledge and information must be processed through a cognitive process to identify and make sense of means-ends relationships. Research in cognitive science has shown that people have different abilities to combine information and concepts with new ideas (see, e.g. Ward et al. (1997)). Moreover, cognitive properties, such as personal traits and attitudes, play an essential role in taking action and taking responsibility to exploit a business opportunity. Psychological constructs, such as risk propensity (Sarasvathy et al., 1998), internal locus of control (Phares, 1976), need for achievement, self-efficacy, innovativeness, stress tolerance, need for autonomy. Proactive personality (Rauch and Frese, 2007) has been investigated in the context of entrepreneurship and was identified to have a significant impact on business creation and entrepreneurial success. These cognitive properties influence the decision process and have been examined in psychological studies of intention-action behavior (see Shapero and Sokol (1982); Ajzen (1991); Robinson et al. (1991)). In addition, not only the cognitive properties of the individual play a significant role in the opportunity recognition and exploitation process and the characteristics of an opportunity itself. Baron (2006) perceived opportunity recognition as pattern recognition or the ability to "connect the dots between changes in technology, demographics, markets, government policies and other factors" (p. 104).

### **2.6.5 Entrepreneur - Opportunity Nexus**

Opportunity is often associated with entrepreneurs and their actions (Dimov, 2011). As pointed out by Kirzner (1973) in his creation theory, opportunities are created by entrepreneurial individuals. Also Sarasvathy et al. (2003) argue that "the opportunity has no meaning unless the actor/s actually act upon the real world within which the opportunity eventually has to take shape." (p. 143). But what makes a business opportunity attractive to entrepreneurs so that they are willing and motivated to exploit the opportunity? Entrepreneurship theories often focus either on the entrepreneurial individual taking a psychological or cognitive perspective (see Begley and Boyd (1987); Forbes (1999); McClelland (1967) or analyze and structure the external environment (see Arrow and Debreu (1954); Baumol (1993); Kirzner (1973)). However, as stated by Sarason et al. (2006, 289):

"While these two rich traditions offer significant insights, we argue that neither explicitly articulates entrepreneurship as the dynamic interrelationship between the individual and the opportunity over time."



Analyzing 210 articles Davidsson (2015, p. 679) comes to the conclusion that "In all, our review clearly suggests that from a nexus perspective, the voluminous research on "entrepreneurial opportunities" has made limited progress." For that reason, it is worth updating the state of the art with regard to the Entrepreneur - Opportunity Nexus and answer the questions raised below. Both the article "The promise of entrepreneurship as a field of research" (Shane and Venkataraman, 2000) and the book "A general theory of entrepreneurship: The individual-opportunity nexus" by Shane (2003) caught entrepreneurship researchers' attention in recent years. As a result, book reviews (Casson, 2005) and attempts to re-conceptualize Shane's concepts (Davidsson, 2015) were developed and discussed by the research community (e.g. Sarason et al. (2006); Zanella et al. (2019)). As mentioned above, identifying entrepreneurial opportunities is a specific and distinct competence. An entrepreneurial opportunity is also seen as a necessary condition for entrepreneurship. Opportunities are identified, evaluated and exploited by entrepreneurial individuals who take risks and action to develop a viable business model and build a business organization. Therefore, researchers and practitioners (entrepreneurs, start-up consultants, investors etc.) should make a particular effort to find the right fit between the entrepreneur/ entrepreneurial team and the business opportunity. In this section, state of the art with regard to the Entrepreneur-Opportunity Nexus is reviewed and discussed. The guiding research questions are

- How is the Entrepreneur - Opportunity Nexus defined in the literature?
- What are the requirements, activities and processes to find Entrepreneur - Opportunity Nexus?
- How do authors conceptualize the Entrepreneur - Opportunity Nexus after 2003?

Therefore, a bibliometric search using the keywords "Entrepreneur AND Opportunity AND Nexus" in the Scopus ([www.scopus.com](http://www.scopus.com)) database was performed. A profound and nexus-oriented survey is presented in 2015 by Davidsson (2015). For that reason, the time frame was set between 2015 and 2022. As a result, 58 documents could be identified. The manual review and selection of the paper based on the main focus of the study resulted in 11 relevant papers (see table 2.15).

Author	Title
Coghlan et al. (2022)	A food-circular economy-women nexus: Lessons from guelph-wellington
Klangboonkrong and Baines (2022)	Disability entrepreneurship research: Critical reflection through the lens of individual-opportunity nexus

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Table 2.15 – *continued from previous page*

<b>Author.</b>	<b>Title</b>
Mehrabi et al. (2019)	Interpretation of the nexus between the entrepreneurs and entrepreneurial business opportunities in the healthcare context: A phenomenological study
Shepherd and Majchrzak (2022)	Machines augmenting entrepreneurs: Opportunities (and threats) at the Nexus of artificial intelligence and entrepreneurship
Ala-Jääski and Pu- umalainen (2021)	Sharing a passion for the mission? Angel investing in social enterprises
Egharevba et al. (2022)	Social Entrepreneurship, the State and National Development: A Viable Nexus for Addressing Social Challenges in a Developing Country Context
Yachin (2019)	The entrepreneur–opportunity nexus: discovering the forces that promote product innovations in rural micro-tourism firms
Fors and Lennerfors (2019)	The individual-care nexus: A theory of entrepreneurial care for sustainable entrepreneurship
Bulut et al. (2021)	The nexus of aging in family businesses: Decision-making models on preferring a suitable successor
Bergner et al. (2021)	The why and the how: A nexus on how opportunity, risk and personality affect entrepreneurial intention
Ali (2022)	Theoretical Assumptions in Entrepreneurship and Caveats of Entrepreneurial Action

Table 2.15: Selected paper with relevance to the Entrepreneur-Opportunity Nexus

In addition, a forward citation revealed additional papers presented in that section. As a starting point, the conceptual, holistic and review paper by Shepherd et al. (2021) is analyzed with regard to the Entrepreneur-Opportunity Nexus. The paper presents critical topics in the entrepreneurship research field and gives a profound conceptualization of the domain using a systematic literature review to detect main topics, key authors and contributions. Unfortunately, the authors explicitly excluded papers on opportunity (recognition) from their search list. However, relevant hints and indicators associated with Entrepreneur-Opportunity Nexus can be identified revealing the importance of the topic: First, the authors inductively categorized the relevant papers into 10 categories. Among them the categories on individual or entrepreneur level are "lead founder" and "founding team" and on the opportunity level "entrepreneurial environment". And second, the authors conceptualized their findings into

three major stages: I) Co-creating a start-up, II) Organizing a start-up, and III) Performing a start-up. Those categories and factors are analyzed in more detail.

### **Personal and interpersonal Level**

On the individual/ entrepreneur level, (Shepherd et al., 2021, p. 15) identify founder attributes discussed in the literature as critical for creating a new venture. In addition to the influencing factors presented above, vital individual attributes are:

- Specific experiences: managerial, industry and entrepreneurial experience
- Employment position: employee entrepreneurship (individuals leaving their jobs to start their own business)
- Entrepreneurial imaginativeness: a cognitive skill useful for new venture creation
- Entrepreneurial identity aspiration: the motivation of the individual to start a new business venture
- Entrepreneurial passion: motivates the new-venture creation process contributing to higher entrepreneurial self-efficacy, which strengthens the intention to start up a new venture
- Positive dispositional affect: founder's general tendency to experience positive emotions, such as enthusiasm and excitement
- Personality traits: hope, optimism, and resilience have a positive association with the transformational leadership of the founder, which in turn had a positive relationship with firm performance.

Moreover, entrepreneurial cognition plays a specific role in the context of opportunity recognition. In addition, cognition and learning processes are critical concepts in educational psychology Greeno et al. (1996). Cognition derives from the Latin word *cognitio* and means "knowledge" or "perception" (Wahrig, 2001, p. 748). According to Edelman and Yli-Renko (2010) the subjective perception of an entrepreneurial opportunity has a mediating effect on the relationship between the objective characteristics of the environment and the individual's effort to start a new venture. In other words, the entrepreneur's motivation and effort to exploit the business opportunity are affected by the perceived attractiveness of the opportunity at hand. To further approach the term "opportunity", key definitions by Sarasvathy et al. (2003) and Hansen et al. (2011) are presented and analyzed. Following the definition of an opportunity by Sarasvathy et al. (2003, p. 142), "An entrepreneurial opportunity, (...), consists of a set of ideas, beliefs and actions that enable the creation of

future goods and services in the absence of current markets for them." The terms "ideas" and "believes" are the focal point of the next definition by Hansen et al. (2011, p. 292): "An opportunity is an idea that has developed into a business form." Following the authors, an opportunity refers to an idea, or a believe that may initiate the venture creation. Dimov (2007, p. 718) argues "that every opportunity has an initial idea as its progeny, i.e., someone must have thought about it for it to ever become a subject of human discussion. (...) In other words, ideas are a necessary but not sufficient condition for opportunities to emerge. The sufficiency condition pertains to the continuous accumulation of evidence and conviction of commercial viability, the existence of a potential market, ability to generate profit, and ability to sustain this profit over time in the face of (increasing) competition". As a result it can be concluded that the entrepreneur's motivation and effort to exploit the business idea and make it an opportunity are affected by the perceived attractiveness of the (business) idea. Perceived attractiveness of the business idea is an attitude towards the idea. Interestingly, perceived attractiveness reflects the desirability construct in the Shapero's and Sokol's Entrepreneurial Event Model (see section 2.5.2) which also supports the attitude classification. Finally, using the quote by Davidsson (2003), the two focal concepts: business opportunity and business idea can be connected:

The term "opportunity" is particularly misleading (...), which at the same time arguably is the most central unit of interest for the scholarly domain of entrepreneurship. I suggest this entity be referred to as *Venture Idea* in order to underline that its viability is not yet proven and to disconnect it from any argument as regards to which extent it is externally or internally based (ibid. p. 339).

A closer look at the critical terms, their definitions and overlaps is essential to approach the Entrepreneur- Opportunity Nexus further. It could be shown that the term "business opportunity" strongly associates with a "business idea", and that positive subjective perception is associated with perceived attractiveness, an attitude referred to as perceived desirability. In summary, the perceived attractiveness/ desirability of the entrepreneur's business idea affects his or her effort to exploit the business idea by starting a new venture. As a result, the desirability of the business idea is identified as a critical condition for the entrepreneur's motivation and persistence initiative. Thus, the guiding question for entrepreneurship educators and entrepreneurs remains: What does it need to develop a venture idea (identify a business opportunity) which is attractive and desirable for the entrepreneur in general and, more specifically, in the context of entrepreneurship education? As a result, the desirability of the business idea is identified as a critical condition for the entrepreneur's motivation and persistence initiative.

Analyzing the selected papers identified in the bibliometric search (see fig. 2.15), relevant evidence and indication with regard to personal level could be found in Yachin (2019). The author collected in-depth interviews with owner-managers of micro-tourism firms in Sweden. In his study, the author found that motivation plays an important role in setting the innovation process in motion and developing products in the respective sphere. Motivation is increased if the products represent what the entrepreneur would like to do or are created to allow the entrepreneur to pursue his/her personal goals and interests.

On the entrepreneurial team level, on the other hand, Shepherd et al. (2021) highlight the role of team diversity concerning working, industry, management and entrepreneurial experience and individual personal attributes of team members within the founding team. As mentioned above, social relationships, social capital and professional networks are critical success factors and intangible resources for entrepreneurs.

### **External Environment**

Next, to find determinants of the Entrepreneur - Opportunity Nexus, the external factors need to be identified and analyzed. As stated by Yachin (2019, p. 50) "the entrepreneur–opportunity nexus should be investigated in the context of the environment, situation and sector (levels of competition, cultural norms and public policies) in which the entrepreneur operates." According to Shepherd et al. (2021, p. 29) "a start-up's external environment refers to the context beyond founders and their emergent ventures." The authors compile relevant literature indicating a strong effect on a new venture formation and success. The external environment which can have an effect on the new ventures and their founders includes family and friends, markets, technologies, and policies and governments. In his review of Schott Shane's work on the Entrepreneur - Opportunity Nexus, Casson (2005, p. 425) constitutes that "opportunities generally arise from changes in the environment in which the entrepreneur operates". These changes can occur in technological, policy and regulatory, as well as in social and demographic spheres including population mobility, urbanization, and educational policies. More specific information about the external environment can not be found in the review.

Another relevant work identified by the bibliometric analysis with regard to the Entrepreneur - Opportunity Nexus is the research paper by Zanella et al. (2019). In their work, the authors explore the role of the firm's strategic posture in the relationship between individual alertness and opportunity identification within an existing firm. After reviewing the literature with regard to the role of the characteristics of the founder in a post-startup phase, the authors come to the conclusion that

"(...) studies acknowledge the importance of the research on how the entrepreneur can affect long-term firm performance, but the role of the interaction

between the entrepreneur and the organization has not yet been considered. In particular, the body of literature fails to explore the individual - opportunity nexus in a post-creation scenario" (ibid, p. 1538).

Unfortunately, a precise operationalization of the Entrepreneur - Opportunity Nexus can not be found in that research. Instead, the search for the body of knowledge and empirical research on the Individual - Opportunity Nexus in the pre-creation phase of a start-up, revealed a certain lack of evidence in the post-creation phase and opens new opportunities and challenges and open questions for future research. Similarly, Davidsson (2015, p. 675) calls the external environment the "External Enables" referring to the regulatory changes, technological breakthroughs, and demographic shifts.

A promising theoretical step towards a conceptualization of the relationship between an agent (entrepreneur) and the environmental structure (opportunity) as a duality is made by Sarason et al. (2006). As mentioned above, the authors identify a significant research gap in the underlying context. Thus, the authors propose using the structuration theory presented by Giddens (1984) to explain the Individual - Opportunity Nexus as a reciprocal interaction of human actors and social structure. The following quotes represent the characteristics of the structuration theory:

"Structuration theory specifies a reciprocal relationship between agency and structure, and as such offers a perspective that specifically articulates the relationship between agent (entrepreneur) and structure (opportunity) as a duality" (Sarason et al., 2006, p. 289).

The main line of the authors' argumentation is that there is a recursive interaction between the entrepreneur and his or her environment. By taking the initiative and performing entrepreneurial activities, entrepreneurs change the environmental conditions and their underlying structures, which in turn influence and change the entrepreneurs, their options and possibilities.

According to Shane and Venkataraman (2000) the following internal (person- related) and external (environmental-related) characteristics of the business opportunity can be used to assess and evaluate its viability and potential to exploit: On the one hand profitability and cost of capital and on the other hand the financial resources, social ties, and entrepreneurial experience. Interestingly, Sarason et al. (2006) state that due to the reciprocal relationship, the social and economic systems profoundly influence the entrepreneur; thus, external social and economic structures provide a solid foundation for evaluating and assessing business opportunities identified or created by the entrepreneur. After introducing and discussing the use, application and benefits of the stucturation theory with regard to entrepreneurship and specifically to the field of entrepreneurial opportunity recognition, the authors conclude:

"However, before we can fully comprehend the nature of this nexus, it is necessary to employ a theoretical lens that (1) accounts for both individual and structural elements, and (2) applies a comprehensive conceptualization of the nature of the nexus" (Sarason et al., 2006, p. 303).

With his re-conceptualization of entrepreneurial opportunities and the entrepreneurship nexus, Davidsson (2015) provides a profound and promising contribution to the research field. Analyzing 210 papers published since 2000 in leading journals, which use "opportunity" in their title, keywords, or abstract, the author identifies 22 nexus-related studies. Among them, the empirical study by Choi and Shepherd (2004) is of particular interest since it explores the factors positively influencing the entrepreneur's decision to exploit a business opportunity. Using an experimental research design and the resource-based view applied in the entrepreneurship domain by Alvarez and Busenitz (2001), the authors found that the following factors are statistically significant and positively influence entrepreneurs' decision to exploit the opportunity: knowledge about customer demand, the possession of enabling technologies, stakeholder support, and solid managerial capability. In other words, anticipated market need (customer demand), access to resources (technologies), support from the social environment (stakeholder support) as well as having the right competences (managerial capabilities) play a significant positive role in the decision process of starting a new venture.

Unfortunately, the latest literature review on opportunity recognition by Filser et al. (2020) does not reveal new and relevant insights and critical contributions to the Entrepreneur - Opportunity Nexus discussion. For that reason, in the following chapter, incremental and analytical steps will be performed towards the empirical conceptualization and testing and evaluation of the individual and structural elements as well as their evaluation concerning the Entrepreneur-Opportunity Nexus.





# Chapter 3

## Methodology

A mixed-method approach was applied to address the research questions and meet the objectives of the thesis. Qualitative and quantitative research methods were used in different phases and steps of the research. However, the Design Science Research Approach (DSR) (Johannesson and Perjons, 2014; Hevner and Chatterjee, 2010; Van Aken and Romme, 2012) was used as an overall research paradigm. It provides a suitable framework and a fitting algorithm and serves as the thesis's primary research strategy. However, the thesis deals with the development, testing and evaluation of an pedagogical intervention in the field of entrepreneurship education. For that reason, the research design also reflects the methodologies primarily used in pedagogy and education. Thus, models for the systematic design of instructions (Dick et al., 2013; Briggs, 1991) were considered and adapted in the study. Despite the specific origin of the DSR in the Information Systems (Hevner et al., 2004; Johannesson and Perjons, 2014), its relevance was also recognized by authors from management science (Van Aken, 2005; Van Aken and Romme, 2012), and entrepreneurship domain (Dimov, 2016; Gutmann Matthias, 2020). In the following sections, the DSR and the instructional design frameworks and their guidelines are presented.

### 3.1 Design Science Research

Design Science Research has a long history. In this dissertation, the discussion starts with the paper of Hevner et al. (2004), which became an essential reference in the field of Information Systems. Unlike the development of theories by behavioral science, the DSR aims to create and validate artifacts intended to solve organizational problems (Hevner et al., 2004, p. 77). DSR is described as an iterative problem-solving process that develops in-depth knowledge of the problem through the building and interaction of the artifact with its problem field. Design Science aims to describe, explain, and predict as traditional empirical science does. In addition, the researcher develops artifacts to solve relevant problems, improve practices,

and contribute to contextual knowledge (Johannesson and Perjons, 2014). To illustrate the heart of Design Science and its original philosophy, the following quotes from the key authors are presented. According to Johannesson and Perjons (2014, p. 7),

*"Design science is the scientific study and creation of artifacts as they are developed and used by people with the goal of solving practical problems of general interest".*

More specifically, Hevner and Chatterjee (2010, p. 5) define DSR as

*"(...) a research paradigm in which a designer answers questions relevant to human problems via the creation of innovative artifacts, thereby contributing new knowledge to the body of scientific evidence".*

Based on an extensive literature review on DSR, the authors Gutmann Matthias (2020) suggest a five-step procedure presented in table 3.1. A similar process can be found in Johannesson and Perjons (2014, p. 77). It is important to note that the DSR is not a linear process. Instead, the researcher will iteratively understand the problems, define the requirements and design and validate the artifact. Hevner et al. (2004, p. 82) describes Design Science as a "problem solving process". For that reason, the research is initialized by identifying and defining a problem and the knowledge base relevant for research and practice by applying qualitative research methodologies, such as systematic literature reviews, case studies or conducting interviews (Gutmann Matthias, 2020). In the second step, the researcher needs to raise the question: What are the critical requirements for the stakeholder? According to Gutmann Matthias (2020, p. 13) "a requirement is a property of an artifact that stakeholders consider desirable". For that reason, the specifications of the artifacts need to be captured and described in detail. Examples of potential requirements are: Efficacy, efficiency, coherence, consistency, modularity, conciseness, usability, comprehensibility, learnability, customizability, suitability, accessibility, elegance, maintainability, flexibility, correctness, generality, interoperability, autonomy, proximity, completeness, robustness, resilience, etc. (ibid). Next, in a creative but analytical process, the artifact needs to be designed and developed to meet the requirements defined in the previous step and effectively solve the problems identified. In the fourth step, the artifact needs to be validated by applying various research methods, empirical, logical or simulating approaches. Some are interviews, observations, experiments, case studies and surveys (Gutmann Matthias, 2020). The artifact must prove to meet the requirements stated in the project above. In case of inefficiency, the artifact is adopted, re-designed and re-evaluated. Finally, the result of the research project needs to be communicated to the scientific community and practitioners for a potential application.

## Design Science Research Process

In DSR, several core activities have been established. Figure 3.1 presents the main steps in DSR introduced by Johannesson and Perjons (2014). It is important to note that the DSR process is not linear. Instead, the DS projects are carried out iteratively.

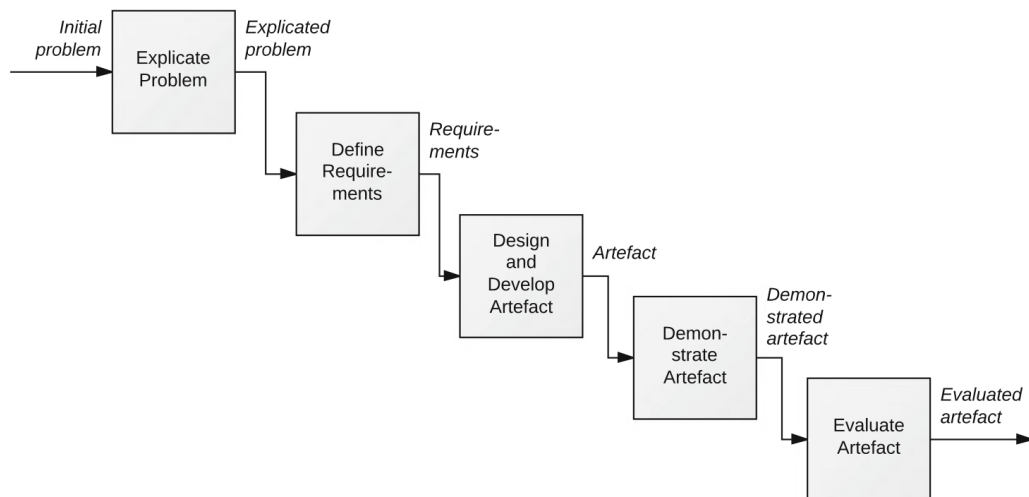


Figure 3.1: The Process in Design Science Research. Source: Johannesson and Perjons (2014, p. 77)

### Explicate the problem

The Design Science process starts with the problem explication. Therefore, the researcher needs to identify a relevant problem for a community and define it precisely, investigating the underlying factors, causes and their effects. The following instructions illustrate the main activities and help researchers in the problem explication phase (Johannesson and Perjons, 2014, p. 83): Describe a practical problem to be addressed; Formulate it in a precise and conceived way; Justify the problem by explaining why it is of general interest, significant, challenging, and possibly original; Specify the stakeholders of the problem.

### Define Requirements

After identifying a relevant problem for global practice, the researcher needs to define problem-specific requirements that will be used to outline a successful solution. Requirements can be features, elements, or contents needed to solve the identified problems successfully.

### Design and Develop Artifact

By understanding the initial problem space in detail and defining requirements for a potential solution, the researcher can create an artifact to address and solve the specific problems. Artifacts can be constructs, models, methods, and instantiations (Hevner et al., 2004). "Conceptually, a design research artifact can be any designed object in which a research contribution is embedded in the design" (Peppers et al., 2007, p. 55). As shown in both Design Science definitions above, the development of an artifact plays a central role in DSR. An artifact is a human-made, the artificial object created to address and solve practical problems (Johannesson and Perjons, 2014). Within DSR, different types of artifacts exist: constructs, models, methods, and instantiations. The description of each type is presented in table 3.1.

<b>Type of Artifact</b>	<b>Description</b>
Constructs	Terms, notations, definitions, and concepts that are needed for formulating problems and their possible solutions. Constructs do not make any statements about the world, but they make it possible to speak about it, so it can be understood and changed. Thus, constructs are definitional knowledge.
Models	Representations of possible solutions to practical problems, so a model can be used for supporting the construction of other artifacts. For example, a drawing can be used for building a house, and a database model can be used for developing a database system. As models prescribe the structure of other artifacts, they express prescriptive knowledge.
Methods	Express prescriptive knowledge by defining guidelines and processes for how to solve problems and achieve goals. In particular, they can prescribe how to create artifacts. Methods can be highly formalised like algorithms, but they can also be informal such as rules of thumb or best practices.
Instantiations	Working systems that can be used in a practice. Instantiations can always embed knowledge, e.g. a database can embed a database model. Some examples of instantiations are a Java program realising a search algorithm, a database for electronic medical records, or a new planet in the computer game Entropia.

Table 3.1: Types of artifacts. Source: Johannesson and Perjons (2014, p. 29)

### **Demonstrate Artifact**

To prove the artifact and validate its feasibility, the researcher needs to expose it to a real-world problem and test its functionality. The artifact's functionality can be tested in experiments, simulations, case studies, or other activities that can appropriately provide proof of the concept Peffers et al. (2007).

### **Evaluate Artifact**

Finally, the researcher needs to evaluate the artifact and present to what extent it fulfils the requirements and solves the problem it was designed to address. "This activity involves comparing the objectives of a solution to actual observed results from use of the artifact in the demonstration. It requires knowledge of relevant metrics and analysis techniques" (Peffers et al., 2007, p. 56). Hevner and Chatterjee (2010) formulates seven guidelines for conducting DSR, which are presented in table 3.2.

<b>Guideline</b>	<b>Description</b>
Design as an Artifact	Design-science research must produce a viable artifact in the form of a construct, a model, a method, or an instantiation.
Problem Relevance	The objective of design-science research is to develop technology-based solutions to important and relevant business problems.
Design Evaluation	The utility, quality, and efficacy of a design artifact must be rigorously demonstrated via well-executed evaluation methods.
Research Contributions	Effective design-science research must provide clear and verifiable contributions in the areas of the design artifact, design foundations, and/or design methodologies.
Research Rigor	Design-science research relies upon the application of rigorous methods in both the construction and evaluation of the design artifact.
Design as a Search Process	The search for an effective artifact requires utilizing available means to reach desired ends while satisfying laws in the problem environment.
Communication of Research	Design-science research must be presented effectively both to technology-oriented as well as management-oriented audiences.

Table 3.2: Guidelines to perform a DSR. Source: Hevner and Chatterjee (2010, p. 12)

## 3.2 Instructional Design

In educational science, researchers and practitioners are concerned with developing methods, tools and systematic approaches for effective pedagogical interventions at schools and in higher education. In that context, a key concept is Instructional Design, also known as "Instructional System Design". Various principles and applications of instructional designs with only a view variations have been developed over time (Gustafson, 1991). According to Briggs (1991), the main benefits of applying the instructional design principles are increased effectiveness, efficiency and relevance of the instruction, which, in turn, increase the quality of students' learning experience. In addition, instructional design principles are extensively applied in military, aerospace and business training (ibid).

Instructional design includes a set of procedures used for developing consistent training curricula. A well-established and widely used model for the systematic design of instruction is the Instructional Design Model by Dick et al. (1990). It presents an orderly but flexible and iterative sequence of activities, procedures, and techniques to be employed by the instructional designer to develop effective pedagogical instruction and establish a congruence between objective, instruction, and evaluation. Similar process models can be found in Briggs (1991, p. 10), Ragan (1993, p. 10) and Kemp et al. (2004). Figure 3.2 presents the Instructional Design Process Model developed by Dick et al. (1990).

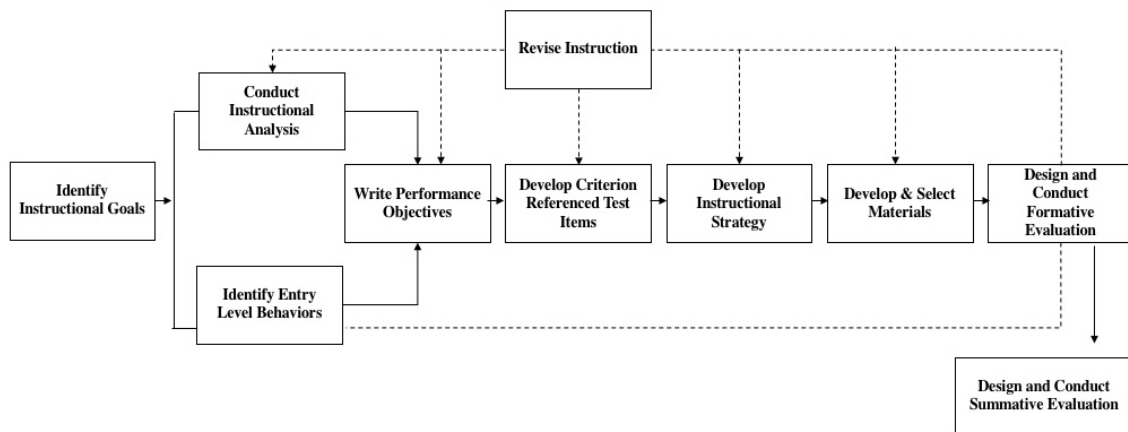


Figure 3.2: Dick and Carey Instructional Design Process Model (1978, 1985, 1990). Source: Obizoba (2015, p. 41)

The explanation of the respective activities and iterative steps is presented in Dijkstra et al. (2013) and D'Angelo et al. (2018). The following overview is copied from Obizoba (2015, pp. 41-42) to give detailed summary of the underlying activities:

- **Identify instructional goal.** Instructional goal refers to what students are able to do at the end of the instruction. Needs assessment from the curriculum, practical experience

with learning difficulties of students in the classroom, or innovations in professional practice enables an instructional designer to determine an instructional goal.

- **Conduct instructional analysis.** Having identified the instructional goal, the designer determines what type of learning is required of the students. Analysis of the instructional goal helps to identify required subordinate skills and the procedural steps needed to learn a particular process.
- **Identify entry-level behaviors.** Entry-level behaviors and characteristics of the learner in terms of knowledge, skills, attitudes, and environment where learning will occur are important considerations in the design of instructional activities.
- **Write performance objectives.** Objectives based on instructional analysis and learner characteristics should emphasize performance of specific behavior skills, the conditions of performance, and the criteria for successful performance.
- **Develop criterion-referenced test items.** Emphasis is on the development of assessment items that are parallel to and measure the student's ability to achieve the intended objectives.
- **Develop instructional strategy.** Based on the five preceding steps, the designer identifies interactive instructional strategies for pre-instructional activities; presentation of information, practice, and feedback; testing; follow-through activities; and the preferred media for achieving the objectives.
- **Develop and select instructional materials.** The designer uses the preferred instructional strategy to produce the instructional materials.
- **Design and conduct formative evaluation.** Series of evaluations conducted through one-to-one evaluation, small-group evaluation, and field evaluation help to collect data needed to identify how to improve instruction.
- **Revise instruction.** Data from formative evaluation reexamine the validity of the instructional and learner analysis, statement of performance objectives, and test items, as well as the instructional strategy. The collected data after the revision, applied to the deficient areas, help to improve the instruction.

### 3.3 Synthesis and Practical Application

Design Science Research (DSR) and Instructional Design approach presented above share similar patterns and frameworks. A vital advantage of the DSR model is a clear focus on

identifying relevant theoretical and practical problems and challenges for the stakeholders. With that respect, the Instructional Design model starts with defining instructional goals to determine what students need to accomplish after successfully participating in the course. However, the assessment of needs is based on the practical experience of the course designer and his or her insights into the students' relevant problems and challenges. The identification of the given organizational conditions and prior competences can be included in the definition of the problem space of the DSR. Next, in both approaches, the requirements for successfully implementing the artefact need to be identified and analyzed. The performance objectives in the Instructional Design define the expected performance of the students after completing the course and can be seen as critical functional requirements of the course. In addition, the evaluation tools and methods need to be defined in a subsequent step to measure if the intervention fulfils the intended learning outcomes empirically. The design and development of the artefact is a critical and creative step in DSR, which includes the development of the instructional strategy and the instructional materials in the Instructional Design approach. Finally, both approaches require an appropriate and requirement-based evaluation of the artefact or the course design. After introducing both frameworks and their critical steps, it can be concluded that the DSR is an appropriate overarching framework for the underlying thesis. To ensure proper development, testing and evaluation of the pedagogical intervention, the domain-specific sequences and required analytical steps not included in the DSR approach are applied in the respective phases according to the requirements of the instructional design model.

### **Problem Explication**

The starting point and the initial question was, "Which theoretical and practical problems exist in entrepreneurship education?" Training and teaching activities in entrepreneurship education at the KIT, Innopolis University of Kasan (Tatarstan, Russia) and the Karlsruhe University of Applied Sciences provided a solid ground for observing students' performance and learning behavior in classes based on the pedagogical interventions at that time. In addition, the analysis of course evaluations and individual and informal feedback after classes provided critical insights into the potential problem field concerning the perceived quality and attractiveness of students' business ideas and their relation to the class performance and learning experience. Based on that, the participation in international entrepreneurship education summits, workshops and scientific conferences from 2015-2021 revealed theoretical and empirical shortcomings within the entrepreneurship educators community.

As a result, the state-of-the-art chapter reveals theoretical and practical shortcomings in entrepreneurship education concerning entrepreneurial intention, opportunity recognition, and the Entrepreneur - Opportunity Nexus (see chapter 2). In addition, the concept of com-



petence as a critical foundation in pedagogy and a list of entrepreneurial competences were empirically investigated in a systematic literature review (see chapter 4) and a qualitative study (see chapter 5).

### **Requirement Definition**

To derive functional requirements for an opportunity recognition workshop, the relevant literature on opportunity recognition was reviewed, and critical factors and challenges in the domain were compiled in the state-of-the-art section (see chapter 2). In addition, based on two master theses and learning diary analysis, qualitative studies were performed with Masters's students participating in entrepreneurship courses on opportunity recognition. Moreover, functional and organizational requirements were defined during the instructional design definition (see chapter 6.7).

### **Artefact Design**

A creative, analytical and iterative process was performed to develop an opportunity recognition workshop in an academic setting at the KIT. It included the course framework, learning materials and a practical evaluation and measurement tool to capture the effects of the Ikigai factors on the desirability of the business idea developed in class (see chapter 6.7 and the subsequent sections).

### **Artefact Demonstration and Communication**

The workshop framework was presented and discussed at scientific conferences (G-Forum 2020, Karlsruhe; International Entrepreneurship Education Summit 2020, Stuttgart), validated, and reviewed with the Human Resources Development and Vocational Training (PEBA) experts at the KIT. In two dedicated sessions, the operationalization of the Ikigai framework was discussed with experts and entrepreneurship educators from the Albert-Ludwigs-University of Freiburg.

### **Artifact Validation**

The artifact was iteratively validated in over 12 courses at the KIT using qualitative and quantitative methods (in a pre- and main study) to capture the effects of the intervention from the organizational and functional perspective (see chapter 6.7 and the subsequent sections).

An overview of the research activities and the research design of the thesis is presented in figure 3.3.

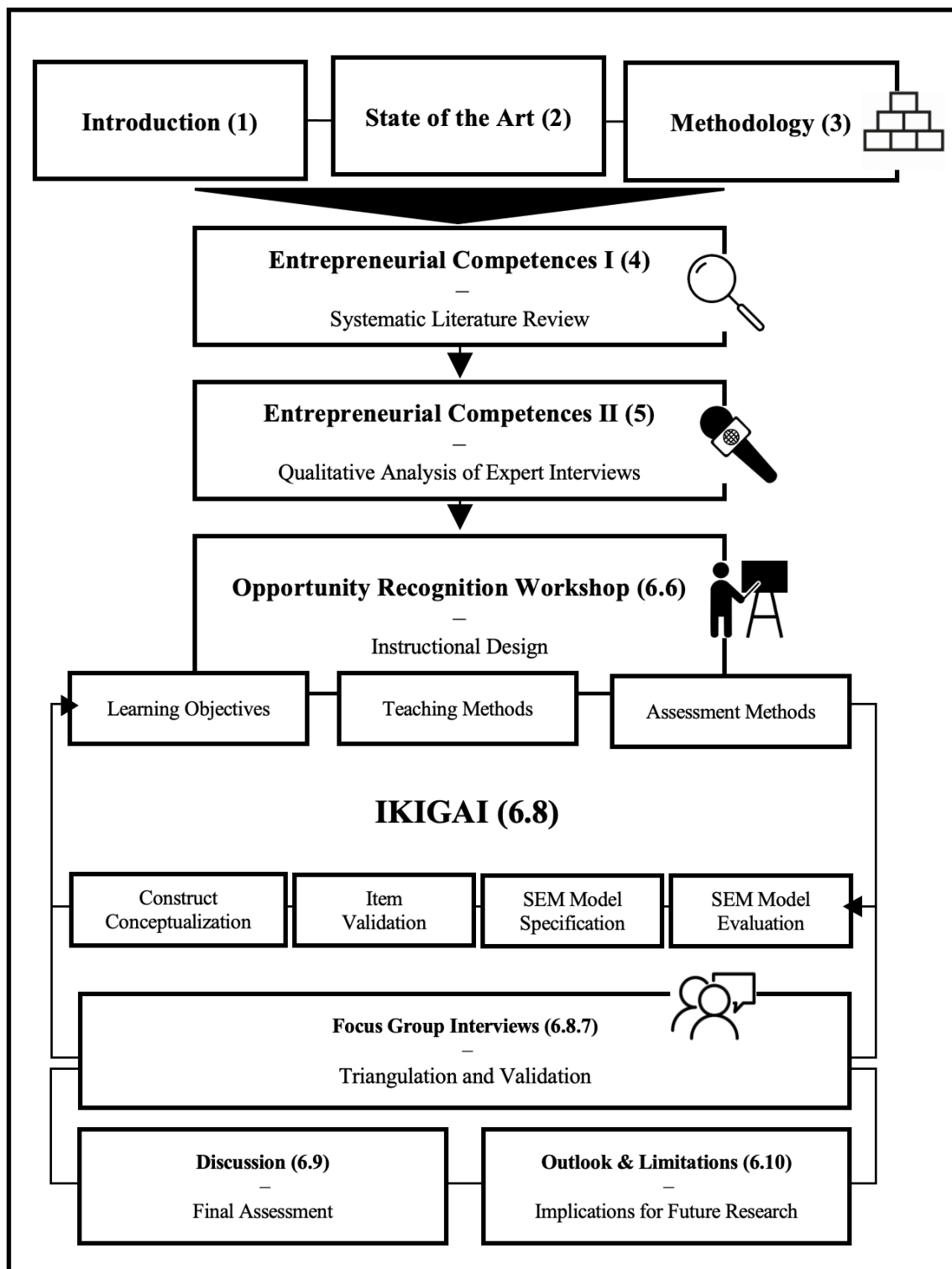


Figure 3.3: Structure of the thesis

# Chapter 4

## Competences - Do we know the concepts?

The following study is a systematic literature review on the concept of competence and entrepreneurial competence. It was published in 2020 in the Springer Entrepreneurship Education Journal and has the following reference: Tittel, A. and Terzidis, O., 2020. Entrepreneurial competences revised: developing a consolidated and categorized list of entrepreneurial competences. *Entrepreneurship Education*, 3(1), pp.1-35. The following chapter is a copy of the publication.

### 4.1 Introduction

The first entrepreneurship course dates back to 1947. Since then, entrepreneurship has become an essential academic and teaching field (Katz, 2003; Kuratko, 2005; Gartner and Vesper, 1994). The fast-growing number of entrepreneurship courses worldwide led to various educational goals, teaching methods and evaluation approaches (Samwel Mwasalwiba, 2010; Purzer et al., 2016). Moreover, a harmonized definition of "Entrepreneurship Education" does not exist in the scientific community. In addition, enterprise education, entrepreneurship education, and entrepreneurial education are often used interchangeably (Samwel Mwasalwiba, 2010). For this reason, Erkkilä (2000) has proposed a unifying term, "entrepreneurial education", encompassing enterprise and entrepreneurship education.

Entrepreneurial education is "the process of providing individuals with the ability to recognize commercial opportunities and the insight, self-esteem, knowledge, and skills to act on them" (Jones and English, 2004, p. 416). Other authors still uphold the term "Entrepreneurship Education" and propose its goal to prepare students for entrepreneurial practice and develop their knowledge, skills and attitudes (Samwel Mwasalwiba, 2010; Garavan and O Cinneide, 1994). It is interesting to note that according to the Recommendation of the European Parliament and the Council of 18 December 2006, knowledge, skills and attitudes are considered the key components of competence (EU, 2006, p. 13). In other

words, entrepreneurship education aims to prepare students for entrepreneurial practice and develop entrepreneurial competences (Lackeus, 2015). As a result, due to the heterogeneity in definitions and approaches, literature and practice illustrate an inevitable confusion about what should be taught in academic entrepreneurship courses and which competences need to be developed.

The better educators can identify and determine qualification goals and learning objectives for entrepreneurship education, the better we can conceive and execute adequate pedagogical training. A key construct in pedagogy that can help educators to clarify and capture the learning objectives is the concept of competence. There are varying definitions and uses of the word "competence" in the context of pedagogy, entrepreneurship education and education policy. Therefore, conceptual clarification is desirable. Also, it is essential to review which specific competences are considered necessary in entrepreneurship education to create a sound basis for designing and implementing high-quality courses and programs. Clarity about entrepreneurial competences will support educators in choosing content, defining learning outcomes, develop the instructional design and appropriate methods for monitoring and evaluation. The discussion about entrepreneurial competences is not new. An in-depth review dates back to the year 2008 by Mitchelmore & Rowley. The topic still attained attention after 2010, and quite a number of newer contributions have been published. This paper reviews these newer contributions and proposes a state-of-the-art synthesis.

This article formulates four contributions: (I) It lists all definitions of "competence" and "entrepreneurial competence" found in the literature and shows overlaps and inconsistencies. (II) It suggests a consolidated definition of "entrepreneurial competence", consistent with prominent definitions in pedagogy, entrepreneurship literature and policy. (III) It creates a merged and consolidated list of all entrepreneurial competences in the entrepreneurship literature. (IV) It creates a category system for the list.

## 4.2 Methodology

The study is a Systematic Literature Review (SLR) based on the guidelines suggested by (Kitchenham, 2007). An SLR aims to systematically find primary studies relevant to the research question by applying a transparent and unbiased search strategy (ibid).

The aim of the review is twofold. First, it aims to develop a comprehensive understanding of state of the art in entrepreneurship competence domain. Second, it aims to identify, consolidate and structure the entrepreneurship-specific competences discussed in the literature.

### 4.2.1 Research questions

The research questions (RQ) and the corresponding sub-questions (SQ) addressed in the review are:

- RQ 1: Which definitions for "competence" can be found in the literature?
- RQ 2: Which definitions for "entrepreneurial competence" (EC) can be found in the literature?
- RQ 3: Which entrepreneurial competences are considered important in the literature?

As a large number of entrepreneurial competences is expected to be compiled from the literature, a potential categorization framework could help to structure and organize the competences in different categories. Therefore, the sub-question to RQ 1 is: What types of competences can be found in the literature (SQ 1.1)? With respect to RQ 2, three sub-questions are formulated: SQ 2.1: Who are the most cited authors concerning ECs in the last ten years? SQ 2.2: What are the most common definitions of an EC used by the authors? SQ 2.3: What types of EC can be found in the literature?

### 4.2.2 Research Process

#### Identification of Literature

To identify relevant research, we applied an iterative search strategy to find relevant literature and databases, test various combinations of key terms, and assess the potentially relevant publications. Identifying literature on the different research questions required a divergent and convergent exploration approach. For that reason, concerning different thematic foci of research, we adjusted the search strategy in the time frame and the scope of the search: Starting with the identification of definitions and the categorizations of competence, the time frame and the domain were not restricted (divergent search on competence from pedagogical and education policy perspective).

As mentioned above, a valid review of entrepreneurial competences appeared by Mitchellmore & Rowley in 2010, who had looked at publications until 2008. For that reason, we limited the search of EC literature to the last decade, from 2008-2018. However, during the research process and the content analysis, we identified publications from authors outside the time frame and included them to address the specific research and sub-questions.

As a result, the search process was conducted manually by searching the search engines in the scientific and policy databases on entrepreneurship, pedagogy, and social sciences. The databases are presented in the table 4.1.

Database	Content	Link
EconBiz	Economy	<a href="https://www.econbiz.de">https://www.econbiz.de</a>
ERIC	Pedagogy	<a href="https://eric.ed.gov">https://eric.ed.gov</a>
Pedocs	Pedagogy	<a href="https://www.pedocs.de">https://www.pedocs.de</a>
Scopus	Multidisciplinary	<a href="https://www.scopus.com">https://www.scopus.com</a>
Hogrefe	Psychology	<a href="https://econtent.hogrefe.com/psychology">https://econtent.hogrefe.com/psychology</a>
Web of Science	Multidisciplinary	<a href="http://apps.webofknowledge.com">http://apps.webofknowledge.com</a>
Google Scholar	Multidisciplinary	<a href="https://scholar.google.de">https://scholar.google.de</a>
JRC Publications	Multidisciplinary	<a href="http://publications.jrc.ec.europa.eu">http://publications.jrc.ec.europa.eu</a>
Cedefop	Multidisciplinary	<a href="http://www.cedefop.europa.eu/">http://www.cedefop.europa.eu/</a>
Tandfonline	Multidisciplinary	<a href="https://www.emeraldinsight.com/">https://www.emeraldinsight.com/</a>
Springer Link	Multidisciplinary	<a href="https://link.springer.com">https://link.springer.com</a>

Table 4.1: Selected Databases for Data Collection

A thesaurus was used to include generic, subsumable and related terms of the key terms "competence" and "entrepreneurship" to identify appropriate search terms. Table 4.2 illustrates the initial search terms used for data collection.

Key Terms	Competence	Entrepreneurship
Generic Term	competence, competency, competencies, competences	Entrepreneurship
Subsumable Terms	skills, expertise, knowledge	founder, entrepreneurial, entrepreneur,
Related Terms	ability, abilities, capabilities, hard skills, soft skills, know-how, qualification, capacity	start up, business, venture, enterprise
Terms in German	Kompetenz, Qualifikation	Unternehmertum, Gründertum

Table 4.2: Definition of Search Terms

First, a search was conducted with the single term "competence" to prove the availability of studies with the research objective. To reduce the high number of initial results and restrict the search field on the conceptualization and definition of the term competence, the keywords "framework" and "concept" were added to the search term (search string 1). Subsequently, search string 2 was applied concerning entrepreneurial competence. The following search strings articulate the final search logic that was applied in the study to find relevant literature for the definition and conceptualization of competence (1) and entrepreneurial competence (2):

1. Kompetenz OR Competenc\* AND (Framework OR Concept)

2. (Entrepreneur\* AND competenc\*) OR Unternehmer\* AND Kompetenz

The search strings include the following variations of the German and English terms: a) Competence, competences, competency, competencies; b) Entrepreneur: entrepreneurship, entrepreneur, entrepreneurial; and c) Unternehmer, Unternehmertum, unternehmerische.

The search strings were slightly modified to meet the specific configuration requirements for each database.

**Study Selection Strategy**

An in-depth understanding of the conceptualization of EC requires the analysis of the state of the art of the concept of competence in its origins. Thus, a search was conducted to identify relevant articles for the definitions and conceptualizations of the term competence in interdisciplinary, pedagogic, and policy databases: Pedocs, ERIC, JRC and Google Scholar. Due to the tremendous number of initial hits (over 3 mill.), the following inclusion criteria were applied:

- Explicit definition of competence
- Peer reviewed article
- Official policy paper
- Concept of competence as a central issue in the article or book.

Next, we applied the search and selection strategy for literature on EC illustrated in figure 4.1. The main objective was to identify studies that fulfill the following inclusion criteria:

- Published between 2008 and 2018
- Includes a definition of EC
- Includes a list of ECs.

The initial search for EC included the related, subsumable, and translated terms (see table 4.2) and generated over 4400 hits with different degrees of relevance for the study. After a first selective revision of articles and identification of existing cases, it emerged that most studies were irrelevant to our research questions. In particular, the related terms produced articles that were out of scope dealing, for instance, with agriculture, accounting, or banking. These terms were excluded in the revised search string. Sources that were not accessible through databases or not obtainable online or in local libraries were also excluded from the list. Systematic literature reviews, research articles, books, and working papers dealing with entrepreneurial competences were included in the final list.

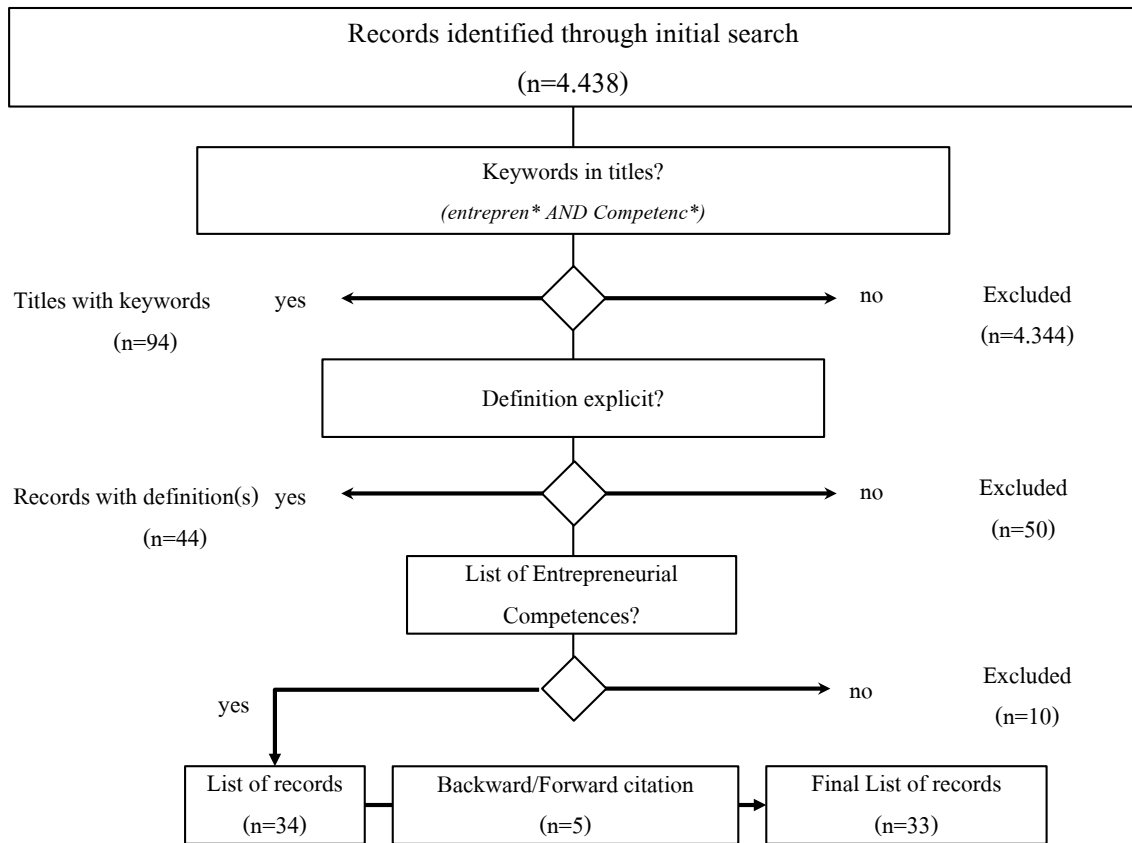


Figure 4.1: Literature Search and Selection Strategy for Entrepreneurial Competence

### 4.3 Results

As a result, 38 key articles on the concept of competence and 32 papers that include a definition of EC and a list of ECs were identified. A final list of the selected research on EC is presented in table 4.3. In this section, the search results are presented. A discussion and conceptual synthesis of the respective findings can be found in section 5.6.

Nr.	Author	Entrepreneurial	Country
1	Ahmad et al. (2010)	competency	Malaysia
2	Ahmad et al. (2018)	competencies	Malaysia
3	Anis et al. (2016)	competencies	Malaysia
4	Bikse and Riemere (2013)	competences	Latvia
5	Bortkeviciene (2015)	competence	Not specified
6	Bortkeviciene and Vaitkevicius (2016)	competence	Lithuania
7	Cho and Zarefard (2017)	competencies	Iran

*Continued on next page*



Table 4.3 – *continued from previous page*

<b>Nr.</b>	<b>Author</b>	<b>Entrepreneurial</b>	<b>Country</b>
8	Edwards-Schachter et al. (2015)	competences	Not specified
9	Gümüşay and Bohné (2018)	competencies	Not specified
10	Ismail (2014)	competency	Indonesia
11	Ismail and Zain (2015)	competence	Indonesia
12	Jamin et al. (2016)	competencies	Malaysia
13	Kabir Mohammed, Hazril Izwar Ibrahim, Khairul Anuar Mohammad Shah (2017)	competencies	Nigeria
14	Khalid and Bhatti (2015)	competencies	Not specified
15	Komarkova et al. (2015)	competence	Europe
16	Kyndt and Baert (2015)	competencies	Belgium
17	Mets et al. (2017)	competences	Estonia
18	Mitchelmore and Rowley (2010)	competencies	Not specified
19	Mitchelmore and Rowley (2013)	competencies	England/ Wales
20	Muzychenko (2008)	competence	Europe
21	Noor Hazlina Ahmad, Yuliani Suseno, Pi-Shen Seet Pattanee Susomrith and Zaiben Rashid (2018)	competencies	Malaysia
22	Peltonen (2015)	competences	Europe
23	Penchev and Salopaju (2011)	competencies	Sweden
24	Phelan and Sharpley (2012)	competencies	England
25	Rasmussen and Wright (2015)	competency	Not specified
26	Rasmussen et al. (2011)	competencies	UK/ Norway
27	RezaeiZadeh et al. (2017)	competencies	Ireland/ Iran
28	Sánchez (2012)	competencies	Spain
29	Schelfhout et al. (2016)	competence	Not specified
30	Sentosa et al. (2017)	competency	Indonesia
31	Tehseen and Ramayah (2015)	competencies	Malaysia
32	Trivedi et al. (2009)	competence	India

Table 4.3: Final List of Literature on Entrepreneurial Competences

### 4.3.1 Definitions of Competence

Regarding RQ 1, 12 definitions of competence were identified and presented in table 4.4. To present a panoramic view on the concept, we identified well-established and recognized definitions on the policy level in the European Union, the United States, and Germany, as

well as other prominent sources in education science Weinert (2001) as well as occupational, pedagogical and psychological perspective (Erpenbeck and Von Rosenstiel, 2011). At first sight, the authors use different approaches, terms, and components to define "competence". A closer look reveals a shared understanding of the concept, which is discussed in section 5.6.

Source	Definition
EU (2006, p. 13)	Competence is a combination of knowledge, skills and attitudes appropriate to the context.
ERIC (2019, online)	The individual's demonstrated capacity to perform, i.e., the possession of knowledge, skills, and personal characteristics needed to satisfy the special demands or requirements of a particular situation
BIBB (2018, online)	Competence is understood as the combination of knowledge and skills in coping with the requirements of action (translated).
DQR (2011, p. 17)	Competence describes the ability and readiness of the individual to use knowledge, skills and personal, social and methodological competences and to behave in a considered, individual and socially responsible manner. Competence is understood in this sense as comprehensive action skills.
Lokhoff et al. (2010, p. 21)	Competence is a quality, ability, capacity or skill that is developed by and that belongs to the student.
Erpenbeck and Von Rosenstiel (2011, p. XXIV)	Competences are considered as dispositions of self-organized behavior.
Weinert (2001, pp. 27)	Competences are understood as cognitive abilities and skills possessed by or able to be learned by individuals that enable them to solve particular problems, as well as the motivational, volitional and social readiness and capacity to utilise the solutions successfully and responsibly in variable situations (translated by (Klieme and Leutner, 2006a, p. 309)).
Klieme and Leutner (2006b, p. 879)	Context-specific cognitive dispositions that are acquired by learning and needed to successfully cope with certain situations or tasks in specific domain.

*Continued on next page*

Table 4.4 – *continued from previous page*

Source	Definition
DeSeCo (2001, p. 13)	For the Swedish Metal Workers' Union, a competence is a combination of what one knows, what one can do, what one wants, and what one dares to do. "Know" means theoretical knowledge, "can" implies practical knowledge and informal knowledge, "want" deals with ambition, attitude, goals and outlook, and "dare" reflects self-confidence and self-esteem
Dominique Simone Rychen (2002, p. 5)	A competence is the ability to meet a complex demand successfully or carry out a complex activity or task.
Beaumont (1995, p. 12)	The ability to apply knowledge, understanding and skills in performing to the standards required in employment. This includes solving problems and meeting changing demands'.
Weigel et al. (2007, p. 11)	In an educational context, competence is the general capability of persons (or organisations) to perform (such as an activity, a task, solve a problem) that is developing, and if a programme is successfully completed, the candidate receives a licence.

Table 4.4: Definitions of Competence

### 4.3.2 Categories of Competence

Five approaches with 14 different categories of competence were identified and are presented in table 4.5. Four of the five sources are policy sources from the European Union (EU Council), Germany (German Qualification Framework DQR, The Standing Conference of the Ministers of Education and Cultural Affairs KMK), and the US (National Research Council). Moreover, the study includes the handbook for competence assessment from the occupational, pedagogical, and psychological perspective (Erpenbeck and Von Rosenstiel, 2011). The categories presented in table 4.5 provide the first indication of potential competence areas. They can be condensed into three main categories: Personal competence, Social competence, and Domain competence.

### 4.3.3 Definitions of Entrepreneurial Competence

To address RQ 2 and the related sub-questions, we identified 33 articles (table 4.3) that primarily deal with entrepreneurial competences, present explicit definitions and list compe-

Table 4.5: Categorization Approaches of Competence

<b>Source</b>	<b>Categorization of competence</b>
EU (2005, p. 11)	Cognitive competence Functional competence Personal competence Ethical competence
DQR (2011, p. 16)	Professional competence Personal competence Learning competence Methodological competence Social competence
National Academies (2012, p. 3)	The cognitive domain The intrapersonal domain The interpersonal domain
KMK (2011, pp.14)	Action competence Professional competence Self-competence Social competence Method competence Communication competence Learning competence
Erpenbeck and Von Rosenstiel (2011, p. XXIV)	Personal competence Action competence Professional-methodological competence Social-communicative competence

tences that are relevant for entrepreneurship (inclusion criteria). In most cases, the authors cited other sources for the definition and specification of ECs. Concerning SQ 2.1 and SQ 2.2, a citation network (fig. 4.2) was developed using the igraph package in R. The network diagram depicts the citation network of authors in the research field of ECs. The size of the knots indicates the frequency of definition citations of EC by other authors. As a result, fig. 4.2 illustrates that the authors Bird (1995), Man et al. (2002), and Mitchelmore and Rowley (2010) are indicated as the most cited authors when introducing and defining the term "Entrepreneurial Competence". The respective definitions of the key authors and the number of their citations are presented in table 4.6. Moreover, we identified these authors to be vital not only concerning the definitions but also for categorization and the listing of ECs.

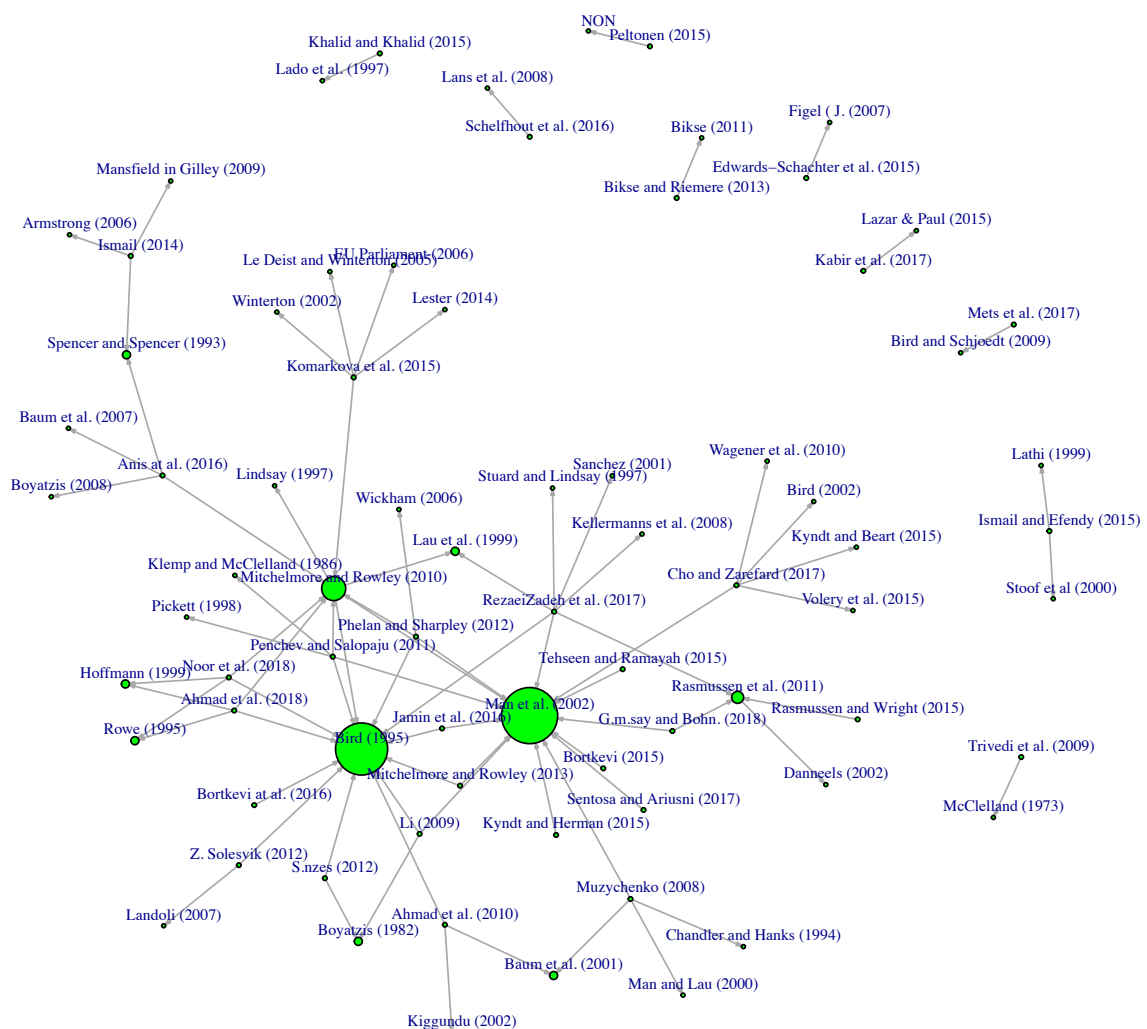


Figure 4.2: Citation Network: Definitions of Entrepreneurial Competence

Author	Definition of EC	n
Man et al. (2002, p. 124)	Entrepreneurial competencies are considered a higher-level characteristic encompassing personality traits, skills and knowledge, and therefore can be seen as the total ability of the entrepreneur to perform a job role successfully.	17
Bird (1995, p. 51)	Entrepreneurial competencies are defined as underlying characteristics such as generic and specific knowledge, motive, traits, self-images, social roles, and skills which result in venture birth, survival, and/or growth.	15
Mitchelmore and Rowley (2010, p. 93)	Entrepreneurial competencies have been identified as a specific group of competencies relevant to the exercise of successful entrepreneurship	10

Table 4.6: Most commonly used Definitions of EC

#### 4.3.4 Categories of Entrepreneurial Competence

With respect to the categorization of ECs (SQ 2.3), we identified seven authors with 22 different categories. The authors' categorization approaches of ECs used are presented in table 4.8. Moreover, the search was extended to find entrepreneurship-related categories and to prove if they could be used for an appropriate ECs categorization framework (see table 4.7). For instance, the phases of venture development and the processes might be an inspiration or even an appropriate categorization approach. We also considered a venture's key activities and components by integrating the nine building blocks of the prominent Business Model Canvas (Osterwalder and Pigneur, 2010).

Author	Categorization	View
Gartner (1985)	Individuals Organization Process Environment	Framework for new venture creation
Glasl and Lievegoed (1993)	Pioneer Differentiation	Phases

*Continued on next page*

Table 4.7 – *continued from previous page*

<b>Author</b>	<b>Categorization</b>	<b>View</b>
Chell and Athayde (2009)	Integration	Process
	Association	
	Ideation	
	Opportunity Recognition	
	Opportunity Formation	
Moberg et al. (2014)	Opportunity Exploitation	Process
	Exploration	
	Evaluation	
Hayton and Kelley (2006)	Exploitation	Entrepreneurial Roles
	Innovating	
	Brokering	
	Championing	
Osterwalder and Pigneur (2010)	Sponsoring	Framework for new venture creation
	Value Proposition	
	Customer Segments	
	Channels	
	Relationship	
	Key Partners	
	Key Resources	
	Key Activities	
	Cost Structure	
	Revenue Streams	
Vesper (1990)	Business opportunity	Elements in Venture creation process
	Technical Know How	
	Business Know How	
	Entrepreneurial Initiative	

Table 4.7: Entrepreneurship related Categories

Author	Categorization of EC
Man et al. (2002)	Opportunity competences Relationship competences Conceptual competences Organizing competences Strategic competences Commitment competences
Schallenkamp and Smith (2008)	Technical skills  Managerial skills Entrepreneurial skills Personal maturity skills
Mitchelmore and Rowley (2010)	Business and management competencies  Human relations competencies Entrepreneurial competencies Conceptual and relationship competencies
Komarkova et al. (2015)	Operational and contextual Entrepreneurial Conceptual and relationship
Lackeus (2015)	Knowledge Skills Attitude
Bacigalupo et al. (2016)	Into action Resources Ideas and opportunities
Bird (1995)	Motive and Trait Level Social Role and Self Concept Level Skill Level

Table 4.8: Categories of Entrepreneurial Competences

### 4.3.5 Entrepreneurial Competences discussed in the Literature

With respect to RQ 3, we compiled a list with 376 ECs (long list) mentioned and discussed in the entrepreneurship literature. Following the procedure in section 3.3, we wanted to identify the most prominent sources with a well-established and recognized list of ECs. Unfortunately, a citation network could not provide much clarity as the citations are widely



scattered. This fact shows another lack of consensus and clarity in the entrepreneurship community. As we find in the definitions of EC, a citation cluster could not be identified. Thus, a consistent and generally accepted source for ECs does not exist in the scientific entrepreneurship literature.

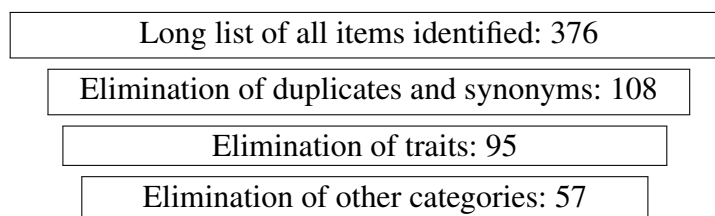


Figure 4.3: Algorithm for selection of ECs

Upon closer inspection, moreover, we identified an apparent ontological inconsistency in the lists of ECs. Many authors present not only ECs in the narrow sense but also a mix of competences, skills, traits and other relevant constructs for entrepreneurial action. To consolidate the list, we applied the selection strategy illustrated in fig. 3. First, we eliminated the duplicates from the long list using spreadsheet software. Subsequently, we identified synonyms (negotiations, negotiating, negotiate), reducing the list to 108 items. After eliminating traits, the record still included other psychological constructs such as abilities, awareness, and attitudes that we compiled in the column "other categories". As a result, we developed a consolidated list of ECs from all 32 literature sources identified by this study, including 57 ECs. Moreover, analyzing the ontology of the terms, we identified and classified the items in three categories: Entrepreneurial Competence, Personal Traits, and other Categories. To ensure the validity and completeness of the final list, we revisited the collection of other prominent authors in the field of EC and confirmed the representation of our list. For that reason, we identified the authors Mitchelmore and Rowley (2010); Komarkova et al. (2015); Man et al. (2002), and Chandler and Jansen (1992) as four important authors in our list as they represent research work on ECs from different decades. Moreover, the lists of Mitchelmore and Rowley (2010) and Komarkova et al. (2015) are generated through in-depth former literature analysis and a desk review. Man et al. (2002) examined previous empirical studies in ECs and presented six competence areas with a short definition of behavioral focus. Chandler and Jansen (1992), on the other hand, surveyed founders in different types of businesses and provided a list of self-perceived ECs (p. 228).

To consolidate the EC list of the four authors with 126 items in total, we also applied the algorithm by eliminating the duplicates and synonyms, traits and other constructs, reducing the list to 32 competences. Based on that, we compared our list with the authors ensuring and confirming that all 32 items were included in our final list.

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The final list of ECs including, personal traits and other categories is presented in table 4.9.

<b>Nr</b>	<b>Entrepreneurial competences</b>	<b>Traits</b>	<b>Other Categories</b>
1	Acquisition and development of resources	Assertiveness	Awareness
2	Administration	Decisiveness	Being non-judgmental
3	Analytic Competence	Independence	Brokering competencies
4	Business plan	Integrity	Championing competencies
5	Collaboration,	Need of achievement	Cognitive ability
6	Communication	Need of autonomy	Commitment to work contract
7	Competitive analysis	Need of power	Concern for high quality of work
8	Conceptual	Openness	Creativity
9	Control	Perseverance	Drive
10	Cooperation	Persistence	Endurance
11	Coordinate	Pro-activeness	Expertise
12	Dealing with different social customs	Risk taking propensity	Familiarity with the market
13	Decision-making	Vigilance	Flexibility
14	Delegation skills		Insight into the market
15	Designing specific products or Services		Intensive effort
16	Develop a team with complementary competencies for your venture		Internal Alignment of values, needs, and beliefs
17	Develop the organization		Intuition
18	Development of products or services appropriate to the firms chosen market niche		Knowledge of accounting
19	Development of the organizational culture		Knowledge of engineering
20	Empathy		Knowledge of finance
21	Environmental scanning		Knowledge of marketing and sales

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Table 4.9 – *continued from previous page*

<b>Nr</b>	<b>Entrepreneurial competences</b>	<b>Traits</b>	<b>Other Categories</b>
22	Ethic		Leveraging competencies
23	Financing and budgeting		Mental ability to coordinate activities
24	HRM		Need for control of financial outcomes
25	Idea generation		Orientation towards learning
26	Implementation Competency		Performing role behaviors
27	Information seeking		Productive Thinking
28	Knowledge exchange		Respect
29	Leadership Competency		Result orientation
30	Learning		Self confidence
31	Logical thinking skills		Self-efficacy
32	Managerial competencies		Self-knowledge
33	Maneuvering in the Industry		Sense of responsibility
34	Marketing		Social & environmentally conscious
35	Monitoring the work of others		Sponsoring competencies
36	Motivating organization members		To take the initiative and responsibility
37	Negotiation		Tolerance of ambiguity
38	Network Competency		Utilitarian View
39	Operational		
40	Opportunity		
41	Organizational Competence		
42	Persuasion		
43	Pitch your ideas		
44	Planning		
45	Political competencies		
46	Problem solving		
47	Recognizing one's own limitations		
48	Seeing the big picture		

*Continued on next page*

Table 4.9 – *continued from previous page*

Nr	Entrepreneurial competences	Traits	Other Categories
49	Sell your products or services to customers		
50	Set goals and act in a creative way		
51	Social responsibility competency		
52	Strategic competency		
53	Take risks		
54	Taking appropriate actions to overcome risks		
55	Teamwork Competency		
56	Technical competence		
57	Vision		

Table 4.9: Consolidated List of Entrepreneurial Competences, Traits and other Categories compiled from the Literature

### 4.3.6 Discussion and Conceptual Synthesis

As stated above, entrepreneurship education aims to prepare students for entrepreneurial practice, which implies the development of entrepreneurial competencies. To develop an appropriate education and training program for future entrepreneurs, educators first need a clear understanding of the concept's meaning to operationalize the development and evaluation of competence in their academic settings. Therefore, we first conduct a critical analysis of the terms "competence" and "entrepreneurial competence" to decompose the concepts into their components and determine a clear definition of both terms. Next, we review and discuss the categorization approaches of competence and EC to develop a framework for ECs. Furthermore, in their systematic literature review, (Mitchelmore and Rowley, 2010, p. 93) describe EC as a "specific group of competencies relevant to the exercise of successful entrepreneurship". Unfortunately, the question remains: What exactly is the "specific group", and which competences does it include? Therefore, we condense the ECs mentioned in the literature and develop a consolidated list of ECs.

### 4.3.7 Clarification and Organization of Competence

The search strategy in our research identified 12 different definitions of competence (table 4.4). However, in his study on competence development in organizations, Mulder (2002) found and compared over 40 definitions of this term. It is a remarkable fact that the term is used neither uniformly nor always appropriately in the literature (Bunk, 1994). Moreover,

the term is associated with different traditions in different countries and is underpinned by contrasting motivations for use in different fields, such as Human Resource Development as well as Vocational Education and Training (Sultana, 2009). As a result, the attempts to establish a consistent terminology of competence had little impact today (Deist and Winterton, 2005). In order to fully understand and classify the various concepts of entrepreneurial competence, challenges, and implications for the development of entrepreneurship education, an in-depth understanding of competence is needed. A comprehensive, in-depth analysis of the competence debate can be found in the work of Deist and Winterton (2005); Mulder (2007); Sultana (2009); Schaper et al. (2012). Based on different perspectives depicted by the authors, we give a thematic overview and classification of the competence debate and present its various approaches and views. The development of competence approaches in other regions and contexts was triggered by a fast pace of economic change and globalized market competition. The socio-economic challenges, therefore, required a long-term strategy and renewed the popularity of competence-based approaches in education and training systems (Sultana, 2009). With its long history, many facets of competence have been developed in various contexts (geographically, domain, and context-specific).

As one of the first authors, White (1959) is credited for introducing the term competence to describe personality characteristics associated with superior performance and high motivation (Deist and Winterton, 2005). Later in the early 1970s, researchers and practitioners were concerned about the extensive measures of personality traits, skills, intelligence, and attitudes to identify and develop successful and effective leaders and company managers. Unfortunately, these tests turned out to be poor predictors of job performance and critical for validation. However, in particular, in the zeitgeist of intelligence tests, McClelland (1973) introduced the concept of competence to predict personal success. With this background, competence approaches initially focused on performance at the expense of complex intellectual processes and reflection in and on action (Sultana, 2009). Different practice-oriented competence approaches (see work of Boyatzis (1982); Schroder (1989); Spencer (1983) evolved to identify, develop and assess the capabilities of managers that were later adopted and refined in other fields, such as Vocational Education and Training (VET) in the USA, Australia and Europe.

The Resource-Based View (RBV) (Barney, 1991; Barney and Arikan, 2001) became an influential economic theory in business management and administration. The RBV emphasizes the firm's internal core resources (i.a., internal competences) being vital to gain a competitive advantage in globalized and highly competitive markets. Moreover, core competences were understood as being at the root of core products (Prahalad and Hamel, 1990; Mulder, 2007).

As stated above, there is a great variety of meanings and definitions of competence. This fact makes competence an unclear and "fuzzy concept" (Deist and Winterton, 2005, p. 29).

The term "competence" is interpreted and defined in terms of its meaning very differently depending on the specific use context. Primarily, competence describes the abilities and dispositions to cope with context-specific requirements (Schaper et al., 2012, p. 12). Mulder (2007) identifies four contexts in which competence can be used: Institutional, jurisdictional, organizational, and personal. Consequently, the concept can be used for accreditation, appropriateness, approval, authorization, certification, entitlement, jurisdiction, license, responsibility, qualification, and right (ibid, p. 7). Based on the discussion and definitions in table 4.4, we consider competence as

the disposition to generate adequate actions to responsibly solve problems in variable situations. This disposition is based on knowledge, skills, and attitudes.

### 4.3.8 Categories of Competence

In this section, we analyze the existing categories of competence compiled in table 4.5 to summarise existing approaches and develop an appropriate categorization approach that can be used for the concept of competence and, subsequently, entrepreneurial competence.

The Oxford Dictionary<sup>1</sup> defines a category as a "class or division of people or things regarded as having particular shared characteristics". Moreover, in philosophy, a category is defined as "Each of a possibly exhaustive set of classes among which all things might be distributed" (ibid). The original work on the process and classification rules can be found in (Bailey, 1994). According to Bailey (1994, p. 1), classification is defined as "the ordering of entities into groups or classes on the basis of their similarity". He discusses the role of taxonomies and typologies in social science and presents the following advantages of classification:

- Description of Types
- Reduction of Complexity
- Identification of Similarities of Cases
- Identification of Differences of Cases
- Presenting an Exhaustive List of Dimensions
- Comparison of Types
- The Inventory and Management of Types
- The Study of Relationships

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<sup>1</sup>online: [www.lexico.com/en](http://www.lexico.com/en). Retrieved: 12.06.2019

- Types as Criteria for Measurement
- Versatility

One of the purposes of the study is to create a consolidated and classified list of ECs, that can be used as a scientific foundation for developing competence-oriented entrepreneurship courses. In addition to the advantages of classification stated above, the classification framework of entrepreneurial competences (CFEC) needs to fulfil the following requirements and be applicable under the conditions stated below:

- *Target Groups*: Students with a technical engineering background, entrepreneurs, coaches, people responsible for *intrapreneurship* programs and accelerator programs in established companies and entrepreneurship support organizations.
- *Objective of the CFEC*: Portray the specific characteristics of competences needed in the entrepreneurship domain and classify them in meaningful clusters. Develop a comprehensive understanding of the ECs and can classify the ECs into appropriate categories. Develop a clear understanding of the difference between the concept of competence, traits and other concepts related to entrepreneurship that is explicitly not competences according to the standard definitions of competence.
- *Application Fields of the CFEC*: Entrepreneurship courses and lectures, accelerator programs, and innovation projects within and outside established companies to compare, reflect on and develop ECs in their own contexts.

In this study, five established approaches with 14 categories of competence were identified and are presented in table 4.5. It emerges that the categories can be semantically grouped on three levels: Personal level (self- or personal competence and learning competence), social level (intrapersonal domain and social-communicative competence) and professional/domain level (functional competence, professional, and method competence). Table 4.10 presents prominent definitions of the categories. Based on that, it can be summarized that the common sense definition of personal competence implies a person's disposition to act reflexively, self-organized, and responsibly to develop and reach personal goals in different contexts.

Category	Definition	Source
Domain Competence	As the dispositions of a person to act mentally and physically self-organized in the solution of factual-objective problems, that is to solve problems creatively and with domain-instrumental knowledge, skills and abilities, to classify and evaluate knowledge in a well-founded way. This includes dispositions to organize activities, tasks and solutions in a methodologically self-organized manner, as well as to creatively develop methods themselves.	Erpenbeck and Von Rosenstiel (2011, p. XXV)
	Professional competence encompasses knowledge and skills. It constitutes the ability and readiness to process tasks and problems in an autonomous, professionally appropriate and methodical manner and to evaluate the result.	DQR (2011, pp. 16)
	Willingness and ability, on the basis of domain knowledge and ability, to solve tasks and problems in a goal-oriented, appropriate, method-based and autonomous manner and to evaluate the result.	KMK (2011, pp.14)
Personal Competence	As a person's disposition to act reflexively self-organized, i.e. to assess yourself, to develop productive attitudes, values, motives and self-images, to develop your own talents, motivations, performance goals. To develop and learn creatively within and outside the work.	Erpenbeck and Von Rosenstiel (2011, p. XXV)
	Personal Competence is also referred to as human competence and encompasses social competence and autonomy. It describes a person's ability and readiness to develop further and to shape his or her own life in an autonomous and responsible manner within the respective social, cultural or occupational context.	DQR (2011, pp. 16)

*Continued on next page*



Table 4.10 – *continued from previous page*

Category	Definition	Source
	The intrapersonal domain, which involves self-management, including the ability to regulate one's behavior and emotions to reach goals. It includes three clusters of competencies: intellectual openness; work ethic and conscientiousness; and positive core self-evaluation. These clusters include competencies such as flexibility, initiative, appreciation for diversity, and metacognition (the ability to reflect on one's own learning and make adjustments accordingly).	National Academies (2012, p. 2)
	Willingness and ability to live and shape social relationships, to grasp and understand gifts and tensions, and to engage and communicate with others rationally and responsibly. This includes, in particular, the development of social responsibility and solidarity.	KMK (2011, pp.14)
Social Competence	As the dispositions to act communicatively and cooperatively self-organized, i. to deal creatively with others, to behave in a group and relationship-oriented way and to develop new plans, tasks and goals.	Erpenbeck and Von Rosenstiel (2011, p. XXV)
	Social competence describes a person's ability and readiness to work together with others in a target oriented manner, understand the interests and social situations of others, deal with and communicate with others in a rational and responsible way and be involved in shaping the world of work and the lifeworld.	DQR (2011, pp. 16)

*Continued on next page*

Table 4.10 – *continued from previous page*

Category	Definition	Source
	The interpersonal domain, which involves expressing information to others, as well as interpreting others' messages and responding appropriately includes two clusters of competencies: teamwork and collaboration; and leadership. These clusters include competencies such as communication, collaboration, responsibility and conflict resolution.	National Academies (2012, p. 2)
	Willingness and ability, as an individual personality, to clarify, to think through and judge the development opportunities, requirements and restrictions in family, career and public life, to unfold one's own talents as well as to conceive and develop life plans. It includes traits such as independence, critical ability, self-confidence, reliability, sense of responsibility and duty. This includes, in particular, the development of well thought-out values and self-determined attachment to values.	KMK (2011, pp.14)

Table 4.10: Definitions of Competence Categories

Social competence is also described as interpersonal competence. It refers to appropriate actions and responsible behavior in a social context, such as communication, cooperation, problem-solving, and leadership.

Domain (also professional) competence is described as the disposition of a person to act and solve domain-specific tasks and problems by using appropriate methods and domain-specific knowledge and skills. Domain competence is seen as the generic, integrated and internalized disposition to deliver sustainable, effective performance (including realizing innovation and creating transformation) in a certain professional domain, job, role, organizational context, and task situation (Mulder, 2014, p. 3). Based on the categorizations and their definitions identified in this study, we suggest the following three categorizations and definitions for competence:

- **Domain competence** : encompasses knowledge, skills, and attitudes that constitute the disposition to process tasks in an autonomous, professionally appropriate, and methodical manner and to evaluate the result.

- **Personal competence** : describes a person's disposition to develop further and to shape his or her life autonomously and responsibly within a particular social, cultural, or occupational context.
- **Social Competence**: describes a person's disposition to work together with others in a target-oriented manner, understand the interests and social situations of others, deal with and communicate with others rationally and responsibly and be involved in shaping the world of work and the lifeworld.

### 4.3.9 Clarification and Organization of the Concepts

A clear definition of EC does not exist as an agreed structure, and a shared understanding of the term is still missing in the literature (Komarkova et al., 2015). In the following chapter, we focus on the different components used by the authors and clarify their meanings and implications. For that reason, the definitions of Man et al. (2002), Bird (1995) and Mitchelmore & Rowley (2010) are presented and decomposed in figure 4.4. Knowledge and Skills are identical to the definitions we found in the conceptualizations of competence. However, in the entrepreneurial domain, we also find additional components such as traits, motives, self-images, and social roles. We, therefore, clarify the terms and their relationship to each other to determine the core components and the specific characteristics of an EC.

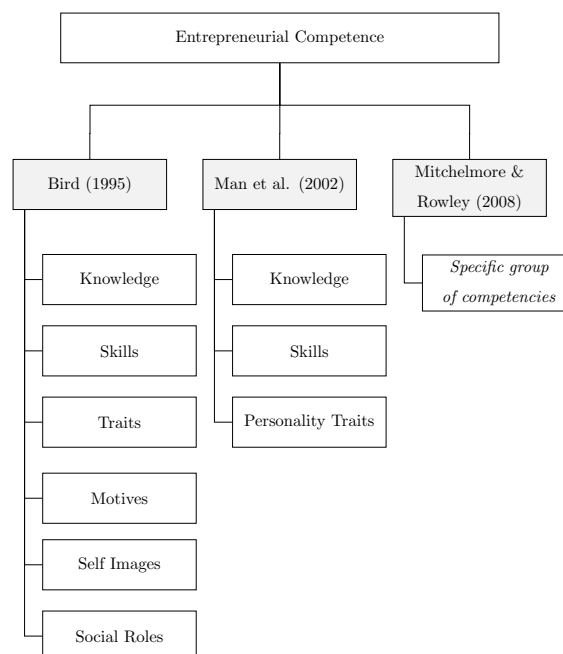


Figure 4.4: Components of Entrepreneurial Competence

**knowledge** : "Knowledge is the outcome of assimilating information through learning. Knowledge is the body of facts, principles, theories and practices related to a field of work

or study. In the context of the EQF, there are two types of knowledge: theoretical and/or factual (EU, 2017, p. 20).

From an educational perspective, prominent foundations of the knowledge concept were developed by Bloom et al. (1956). In 2002 however, Krathwohl (2002) published an overview of an updated version of Bloom's Taxonomy of educational objectives Bloom et al. (1984). This revised taxonomy attempts to correct some of the challenges with the original taxonomy. In his version, Krathwohl differentiates between the content of thinking (*knowing what*) and the procedures used in solving problems (*knowing how*). He introduced a new structure of knowledge dimensions with four, instead of three main types of knowledge (p. 214):

*Factual knowledge*: The essential elements that students must know to be acquainted with a discipline or solve problems in it (Knowledge of terminology; Knowledge of specific details and parts).

*Conceptual knowledge*: The interrelationships among the basic elements within a larger structure that enable them to function together (Knowledge of classifications and categories; Knowledge of principles and generalizations; Knowledge of theories, models, and structures).

*Procedural knowledge*: How to do something; methods of inquiry, and criteria for using skills, algorithms, techniques, and methods (Knowledge of subject-specific skills and algorithms; Knowledge of subject-specific techniques and methods; Knowledge of criteria for determining when to use appropriate procedures).

*Metacognitive Knowledge*: Knowledge of cognition in general as well as awareness and knowledge of one's own cognition (Strategic knowledge; Knowledge about cognitive tasks, including appropriate contextual and conditional knowledge; Self-knowledge).

**Skills**: An individual needs profound knowledge which is then applied in a given situation to solve problems and complete tasks. "Skills means the ability to apply knowledge and use know-how to complete tasks and solve problems. (...) Skills are described as *cognitive* (involving the use of logical, intuitive and creative thinking) or *practical* (involving manual dexterity and the use of methods, materials, tools, and instruments)" (EU, 2017, p. 20). Moreover, the National Research Council (National Academies, 2012) describes skills as

knowledge, that can be transferred in new situations. Transferable knowledge includes content knowledge in a domain and knowledge of how, why, and when to apply this knowledge to answer questions and solve problems. This latter dimension of transferable knowledge- how, why, and when to apply content knowledge- is often referred to in terms of "skill" (p. 2-2).

In other words, to complete tasks and solve problems in different situations, knowledge needs to be applied. Skill as a concept that transfers knowledge into action is, therefore, a crucial second component of competence.

**attitude:** "An attitude is a disposition to respond favorably or unfavorably to an object, person, institution, or event (Ajzen, 2005, p. 3)". Ajzen (2005) describes attitude as a "hypothetical construct" that is inaccessible to direct observation. However, attitudes allow positive or negative evaluations and, therefore, can be measured through responses and or observations of human behavior (ibid). According to Ajzen, three categories of responses go back to Plato: Cognitive responses, affective responses, and conative responses. *Cognitive responses* reflect perceptions of, and thoughts about, the attitude object. *Affective responses* on the other hand, can be described as feelings toward an object of attitude. In contrast, *canative responses* is described as action and behavior concerning the attitude object. In other words: attitudes determine a positive or negative effect on thoughts, feelings, and actions. An unfavorable attitude toward an object or an event (i.e., becoming an entrepreneur) has a high negative impact on the individual's behavior (performance) or decisions. In empirical educational research, performance is a critical requirement for demonstrating, assessing, and certifying an individual's competence. For that reason, we see attitude as the third component of competence.

**Personality Trait:** "A personality trait is defined as a characteristic of an individual that exerts a pervasive influence on a broad range of trait-relevant responses" (Ajzen, 2005, p. 2). According to Ajzen (2005), most social scientists agree on the evaluative nature of attitudes as they manifest themselves in a wide variety of observable responses (p. 3). In contrast, personality traits describe response tendencies (i.e., to be sociable or self-confident) and are not necessarily evaluative (p. 6). While attitudes are viewed as more alterable and open to transformation, personality traits are assumed to be relatively stable over time. They focus on the individual himself- or herself, and they can thus be used to differentiate between individuals and to classify them into different personality types. The most prominent personality traits are defined by Goldberg (1990)) as the "Big Five" factors:

1. Surgency (or extraversion),
2. Agreeableness,
3. Conscientiousness (or dependability),
4. Emotional stability (vs. neuroticism) and
5. Culture (or openness to experience)

Personality traits are viewed to be relatively stable and difficult to change. Therefore, they are not the best objective for development in entrepreneurial education settings. Per-

sonality traits are developed independently from education programs so that the person already possesses specific traits and personal characteristics. They, of course, are part of an entrepreneurial personality and can support learning and decision processes, but in contrast to traits, knowledge, skills, and attitudes are the pedagogically recognized target objects to be developed and can be measured in academic settings. With this background, we do not include personality traits, as suggested by Bird (1995), as an integral component of an EC.

**Self-image:** The concept of self-image is defined by Rosenberg (2015) as an attitude. "We conceive of the self-image as an attitude towards an object" (p. 5). It is congruent with the conceptualization of attitude by Ajzen (2005) and is, therefore, not an additional component of competence but an attitude towards him- or herself.

**Social Role:** "A social role is (...) defined as a set of expectations oriented toward people who occupy a certain position in a social system or group" (Gouldner, 1957, p. 282). To get a clear understanding of the concept of social role, the concept of social status needs to be considered first. Social status is "a position in a particular pattern which is a collection of rights and duties" (Linton, 1936, p. 113). Therefore, as stated by Gouldner (1957), a social role is considered a set of expectations towards people in a specific social position or status. The individual and society reinforce expectations, rights, duties, and responsibilities connected to a social role and help people find orientation and define an expected behavior in different situations. According to the underlying definition, a social role is not an internal part of and is not controlled by the individual. A social role may indirectly contribute to developing competence in a specific domain or even influence an attitude towards an object or an event. In this case, the expectations and duties (social roles) may directly affect the three levels of attitude. As shown above, attitude is already an integral part of competence. In conclusion, the concept of social role is not an essential part of competence.

**Motive:** A branch of psychology is motivational psychology. It deals with the research and explanation of purposeful human behavior and motivations, the "why" and "what for" that causes people to do or not do certain things. According to McClelland, a motive (lat. Motus = motion, drive) is a "recurrent concern for a particular goal state, based on a natural incentive, that energizes, orients and selects behavior" (McClelland, 1985, p. 590). In other words, it is a reason for doing something. Thus, motives are considered to be components of self-control, as they enable the satisfaction of needs (Theilengerdes, 2012, p. 19). As McClelland (1985) proposed, the Theory of Needs states that human behavior is affected by three motivational factors - The need for Power, the Need for Achievement, and the Need for Affiliation. His studies indicate a strong positive correlation between the need for Achievement and performance. Moreover, he found that a country's economic development largely depends on the extent to which its citizens need achievement (McClelland, 1967).

Murray (1938, pp. 80) states that "Actions which express what is commonly called ambition, will-to-power, desire for accomplishment and prestige have been classified as follows:

- *Need for Superiority*: The need for Achievement (will to power over things, people and ideas) and the need for recognition (efforts to gain approval and high social status).
- *Need for Achievement*: To overcome obstacles, to exercise power, to strive to do something difficult as well and as quickly as possible (...).
- *Need for Recognition*: To excite praise and commendation; to demand respect; to boast and exhibit one's accomplishments; to seek distinction, social prestige, honors or high office."

Gartner (1985) recognized the Need for Achievement as an essential psychological characteristic of an entrepreneur. As described above, the concept of a motive is highly interconnected with our needs. A closer look at the theory of needs reveals that Need for Achievement, for instance, is a psychological characteristic and is in line with the definition of a personality trait by Ajzen (2005). Moreover, the research provided evidence that personality traits influence the realization of implicit motives (Hofer et al., 2015). Internal factors, such as personality traits and the individual structure of needs, as well as external factors (social norms and cultural characteristics), may result in different motives for behavior and performance. As described above, personality traits are relatively stable over time and challenging to change from the outside. As external factors, culture, and social norms are fixed components and can not be addressed for development in an academic setting, the concept of a motive, as suggested by Bird, is not an integral part of an EC.

In 2015 the European Commission published a report on entrepreneurship competence that presents state-of-the-art identifying and comparing different theoretical and practical approaches from the academic and entrepreneurial world (see (Komarkova et al., 2015)). To define competence, the authors refer to the recommendation of the European Parliament EU (2006) that defines competences as "knowledge, skills, and attitudes" (p. 13). Another policy source is the OECD background paper by Lackeus (2015) who also found three basic components of competence: "*Entrepreneurial competencies are defined here as knowledge, skills and attitudes that affect the willingness and ability to perform the entrepreneurial job of new value creation*" (p. 12). Based on the discussion above, we consider Entrepreneurial Competence as

the specific set of domain competences, social competences and personal competences needed to generate entrepreneurial action.

### 4.3.10 Categories of Entrepreneurial Competence

Section 3 presents categories of competence and entrepreneurial competence (Tables 5 and 7) identified in the literature. In addition, we expanded our view in table 4.7. We collected potential entrepreneurship-related categories to cover various options as a basis for structuring and categorizing ECs. Based on the list of ECs identified in the literature, we critically examine the categories suggested by the authors and review their choices for classification.

The categorization approaches in table 5 show different concepts in the entrepreneurship domain such as *competence* (Man et al. 2002), *skills* (Schallenkamp, 2008), *motive and traits* (Bird, 1995), *domain field* (Komarkova, 2015), and *general terms* (Bacigalupo, 2016). Moreover, in table 9 we find processes and venture development phases (Moberg et al., 2014; Chell and Athayde, 2009; Glasl and Lievegoed, 1993), different areas as a framework for venture creation (Gartner 1985), and building blocks of a venture (Osterwalder, 2010) as the distinctive elements. In particular, concerning ECs, we find a heterogeneous view on the classification of ECs. Furthermore, it is unclear how the authors developed the categories and which methods they used for classification.

Intuitively, a process-based classification would serve as a good overview and insight into a venture development process. A framework for venture development would be beneficial for students and other stakeholders. Unfortunately, the phases and processes are neither distinct and linear nor standardized for different projects, markets, and products. Instead, the processes are interconnected and recurring. The Lean Start-Up method by Ries (2011) suggests a cyclical and interactive approach to venture creation. In this case, the categories could not provide the criteria of exhaustiveness and mutual exclusives.

However, the venture creation processes take place on different levels and include various categories of competences. Based on the types depicted in Tables 5,7 and 8, three levels could be identified: (I) Personal or individual level, (II) Interpersonal or team level, and (III) Domain-specific expertise level. First, the entrepreneur and the team members need personal competencies, such as acting proactively, processing and understanding complex information and recognizing their limitation by reflecting on their behavior, decisions, and actions. Next, as they interact with the stakeholder inside and outside the company, they need social competences for communication, problem-solving, and upholding the spirit and the positive atmosphere within the team members and external partners. Finally, domain competences are required to identify an opportunity, develop an organization, and exploit the opportunity (III).

Based on the consolidated list of ECs in table 8, we inductively developed a categorization framework and categories similarly introduced by Man et al. (2002). As a final result of the study, we adapt the categorizations to the requirements of the CFEC, consolidate



the ECs from the literature review and suggest the list of ECs integrated into a framework for the CFEC. Considering the scope and aim of the study and the CFEC requirements, we transfer the general wording of the ECs into a competence-oriented version using the infinitive of suggested verbs. However, we excluded four items from the consolidated list: "Managerial competence" is a subcategory of domain competence and can be classified in the "Strategic and Management" competence category. "Operational competences", on the other hand, cover the daily, hands-on individual efforts required to deliver results of given tasks. It is a subcategory of management competence and can be described as "Operation management". We did not find any specific competences in the literature that we could subsume to that category. It is also the case with "political" and "technical" competence; therefore, we exclude the categories from our list. "Technical competence", however, is a particular category of domain competence. Undoubtedly, it is of vital importance for creating a specific type of new venture, especially the New Technology Based Firms (NTBF), but no particular competence could be identified in our list that could be classified into this category.

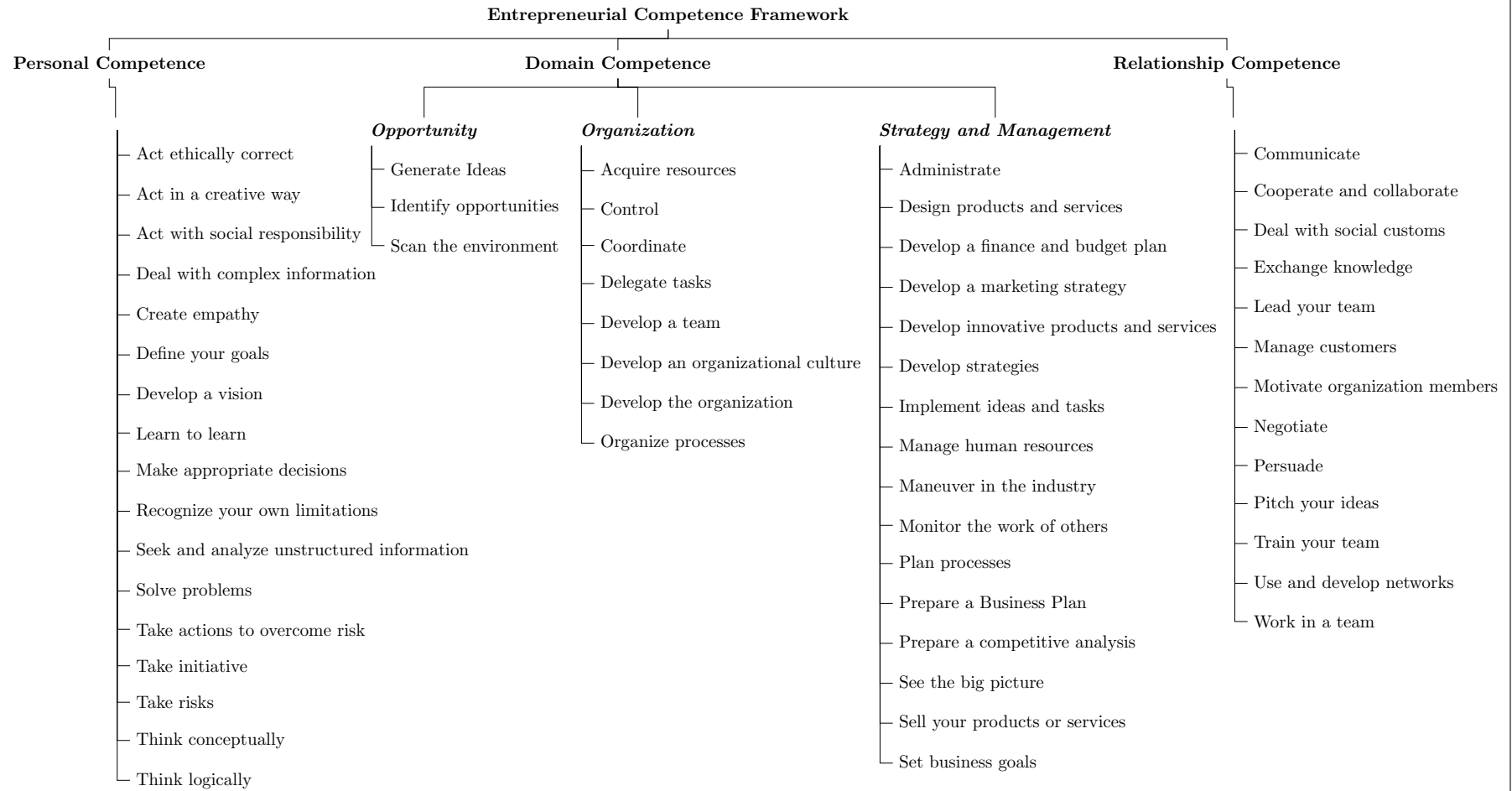


Figure 4.5: Categorized Framework of Entrepreneurial Competence

## 4.4 Conclusions and Limitations of the Study

The Systematic Literature Review on Entrepreneurial Competences provided a comprehensive insight into conceptualizing and categorizing the terms "competence" and "entrepreneurial competence". We identified different approaches for the definition and categorization of both terms. As a result, we present a variety of perspectives and the potential applications of the concepts. Although many definitions of competence exist, they have in common that competence includes the essential knowledge, skills, and attitudes to solve problems in variable situations.

We conclude that domain competence, personal, and social competence are appropriate categories for competence. In the domain of entrepreneurship, we identified the key authors of the definitions of EC, compiled their definitions, and presented a consolidated list of ECs that we found in the lists of the authors. We apply the categorization approaches to the ECs to assist educators in developing competence-oriented entrepreneurship courses. However, it can not answer the question: What are the most decisive ECs?

As a suggestion for further research, we propose to examine the variety of ECs further and develop a scientifically sound and consolidated recommendation for vital ECs that should be developed in entrepreneurship classes. Moreover, we observe that knowledge, skills, and attitudes as the fundamental components of competence are often used without a critical discussion, classification, and differentiation by the authors in the entrepreneurship domain. A clear understanding of the psychological concepts, such as traits, motives, and attitudes, would help the scientific community, coaches and trainers, as well as the entrepreneurs, to create a clear understanding of necessary activities and the required competences for personal development, team formation, and the construction, conduction and, assessment of education programs.

Based on the insights from the study, we developed a Classification Framework of ECs and suggested a consolidated list of ECs. The identified main categories are (I) Domain Competence, (II) Personal Competence, and (III) Relationship Competence. For Domain Competence, we found three subcategories that characterize the entrepreneurship domain: Opportunity Recognition, Organizational, and Strategic and management Competence. It is evident, however, that not all of the mentioned competences can be developed in entrepreneurship education settings. Many of the competences, especially the Strategic and Management competences, will be developed in a practical business environment or specific business administration degree programs. Entrepreneurship Education and research is still a young discipline. The historical roots of its regional, contextual, and functional development caused the heterogeneity in learning objectives, training methods and evaluation approaches, as well as a great variety in definitions of key terms Entrepreneurship Education and Entrepreneurial Competence. Therefore, the CEC's purpose is not to define an exhaustive

list of ECs that should be taught in academic classes but to present an accurate inventory of ECs and their categories. It is a recommendation and an opportunity for future research to investigate and find a common understanding of the essence of ECs for Entrepreneurship Education.

The study was performed according to the guidelines for Systematic Literature Reviews by Kitchenham and Charters (2007). The systematic and unbiased identification of relevant research is vital for the results and conceptualization of the topic. In fact, due to the search strategy and the application of the search string, we had to deal with a significant amount of potentially relevant publications. It can not be excluded that some of the critical research was not recognized or not captured by the search strategy. In particular, concerning the limited period 2008-2018, it is possible that we missed essential insights from previous years of research. In this context, the list of ECs presented in table 8 and in the final CEC Framework may not be exhaustive. For instance, the key term "Business Model" is not indicated in our list. It is undoubtedly one of the critical ECs students need to prepare in entrepreneurial classes worldwide. Entrepreneurs need to develop to operate and acquire financial resources from investors.

# Chapter 5

## Entrepreneurial Competences - Teaching and Practise

### 5.1 Introduction

Entrepreneurial competences are considered critical success factors for entrepreneurial activities. Literature reviews and established competence frameworks propose a variety of conceptualizations and lists of entrepreneurial competences. However, an available, validated, agreed set of entrepreneurial competencies has not been established for entrepreneurship education. This study aims to bridge the gap between academia and practice by studying and presenting a critical set of entrepreneurial competences needed to realize entrepreneurial activities successfully. Based on the entrepreneurial competences derived from the empirical study of 26 in-depth interviews with entrepreneurs, start-up coaches, lecturers and company experts, an updated set of key entrepreneurial competences is presented, and implications for entrepreneurship education are discussed.

According to the OECD (2018), our societies undergo rapid and profound societal, economic, technological, and environmental changes causing tremendous challenges for future societies and new generations. To meet the challenges, education plays a critical role in nurturing the key competences in everyone, allowing people to find new solutions for relevant problems to create a sustainable future. In Europe, entrepreneurship competence is part of the eight key competences for lifelong learning. Entrepreneurial competences significantly positively impact entrepreneurial performance (Sánchez, 2012; Pranowo et al., 2020; Bacigalupo et al., 2016). The European Commission identifies and promotes entrepreneurial competencies as the key success factor to foster entrepreneurial action, enhance competitiveness, and job creation Commission (2018, 2014). For that reason, literature reviews and established competence frameworks propose a variety of conceptualizations and lists

of entrepreneurial competences (see Bacigalupo et al. (2016); Tittel and Terzidis (2020); Lackeus (2015)).

Mitchelmore and Rowley (2010) identify entrepreneurial competences as "a specific group of competences relevant to the exercise of successful entrepreneurship" (p. 93). However, in research, a practice, a harmonized and valid definition of a critical set of entrepreneurial competences does not exist. Therefore, it is vital to understand the concept of entrepreneurial competence and define a critical set of competences relevant to entrepreneurship and entrepreneurship education. Concerning that, the authors Tittel and Terzidis (2020) compiled a list of 57 different entrepreneurial competences mentioned by scholars in the field of entrepreneurship and entrepreneurship education. This empirical study builds on the definitions of competence and entrepreneurial competence proposed by Tittel and Terzidis (2020), who define competence as

"(...) the disposition to generate adequate actions to responsibly solve problems in variable situations" (p. 19).

According to the authors, competence is based on knowledge, skills, and attitudes (for a similar conceptualization see González and Wagenaar (2006); Commission (2018)). The authors derive three categories for competence: domain competence, personal competence, and relationship (social) competence. Therefore, entrepreneurial competence is defined as

"(...) the specific set of domain competences, social competences and personal competences needed to generate entrepreneurial action." (ibid, p. 27).

A detailed analysis of the research papers on entrepreneurial competences reveals that the authors often do not present how they identify, select, and prioritize the entrepreneurial activities and competences addressed in their research. This paper focuses explicitly on entrepreneurial competences and studies the configuration of the "specific set" of competences needed for entrepreneurial success. Educators, experienced start-up consultants, company experts and entrepreneurs were identified for an expert panel group to share their knowledge and experience. Domain, social and personal competences related to entrepreneurship are developed in educational programs (lectures, seminars, summer schools, etc.) at universities (see Komarkova et al. (2015) for a review on initiatives, teaching approaches, and best practices in Europe). However, there is little guidance for educators and entrepreneurship program designers to create practice-relevant educational offers. Moreover, extensive lists of entrepreneurial competences do not help select and prioritize competences and learning objectives for entrepreneurship courses and classes.

The diverse teaching and learning approaches in entrepreneurship education led authors to align and compare entrepreneurial competences discussed and developed in academia

with competences required in entrepreneurial practice. In this regard, Edelman et al. (2008) compared start-up activities of nascent entrepreneurs with the contents of 14 textbooks on entrepreneurship to find out if entrepreneurship education teaches what entrepreneurs need and do. As a result, the authors identified an evident "lack of correspondence between teaching and practice(..)" (p. 67).

Focusing on and investigating the trends and challenges in entrepreneurship education for the 21st century, Kuratko (2005) raises the importance of the connection and integration of practitioners and entrepreneurs in entrepreneurship education:

"It has been argued for, and financially supported by, some foundations such as the Coleman Foundation, the integration of entrepreneurs ("E's") into the classroom setting with academics ("A's"). Even with a certain foundation's constant efforts, the question still remains as to whether we have "bridged" the gap or simply slowed the division. What meaningful dialogues have occurred that have truly impacted our curricula? We need to be sure that our practicing entrepreneurs present more than interesting stories and delve into the real problems and issues involved with their ventures. This is our challenge as entrepreneurship educators. Students need the exposure to those entrepreneurs who have paid the price, faced the challenges, and endured the failures. We must take the lessons learned from our experienced entrepreneurs' "make a difference" idea". (p. 589)

Against this background, the article formulates three contributions: First, it captures critical entrepreneurial activities and presents an updated set of entrepreneurial competences provided by entrepreneurs, entrepreneurship educators, start-up consultants, and business experts. Second, based on the stakeholder's perspective, it provides an updated and prioritized competence profile needed in an early start-up stage. Third, it presents and discusses implications for entrepreneurship educators.

## **5.2 State of the Art**

The latest bibliometric analysis on the landscape of entrepreneurship education is provided by (Wan and Lv, 2021). The authors present the development of thematic fields and the research focus in entrepreneurship education from 2001 until 2020. Table 5.1 presents relevant keywords in the respective time frame.

Wan and Lv (2021) identify that current aspirations and research efforts focus on the configuration, development, and fostering of entrepreneurial ecosystems, the role of human capital, and therefore entrepreneurial competences, as well as university-industry cooperation for knowledge spillover and transfer from universities to companies and vice versa. In

Year	Keywords
2001–2005	Model; management; field; side; validation
2006–2010	Entrepreneurial intention; innovation; enterprise; attitude; performance
2011–2015	Impact; intention; self-efficacy; engineering student; gender
2016–2020	Women; <i>human capital</i> ; business creation; satisfaction; <i>knowledge transfer</i>

Table 5.1: Keywords in Entrepreneurship Education in from 2001 to 2020. Source: (Wan and Lv, 2021, p. 391) (extract).

this context, knowledge transfer can also be considered the alignment and synchronization of academic programs and labour market requirements.

Updating the latest developments in the field of entrepreneurial competences, recent research has been identified through a forward citation analysis of the systematic literature review by (Tittel and Terzidis, 2020). As a result, 24 related research papers were identified. The results are summarized and presented in table 5.2. Scholars believe that good qualitative research is more complex and time-consuming than well-performed quantitative research (Gephart Jr, 2004). This observation can be confirmed since investigations analyzed by the forward citation use surveys and questionnaires to collect data within a quantitative research approach. Next to systematic literature reviews, case studies, and bibliometric analysis, only one research project in the list used a qualitative research method applying a relational linguistic and conceptual analysis to derive and compare lists of entrepreneurial competences. Most studies are conducted to develop, identify, or evaluate entrepreneurial competences in an entrepreneurship education context. The latest bibliometric analysis by Fagadar et al. (2021) shows the most common terms used in publications on entrepreneurial competences. The most prominent keywords are "education," "entrepreneurship education," "students," and "entrepreneurial skills." Based on the results of the forward citation and the bibliometric analysis by Fagadar et al. (2021), it can be said that most research in the field of entrepreneurship within the last years has been initiated and conducted in entrepreneurship education.

Other authors try to identify competences relevant to entrepreneurship education courses or to prepare students for the labour market by developing specific qualifications, such as project management (see Sołtysik et al. (2020)). For the development of the pedagogical intervention in entrepreneurship courses, authors align with existing frameworks and draw on relevant competences provided by the European Entrepreneurial Competence Framework (EntreComp) by Bacigalupo et al. (2016) (see e.g. Morselli and Gorenc (2022)). Other authors used systematic literature reviews to detect the sources for definitions and derive relevant lists of entrepreneurial competences (see Mitchelmore and Rowley (2010)). Since entrepreneurship is a dynamic field of research and practice, new and other relevant competences may



exist to meet the latest requirements of entrepreneurial activities. Unfortunately, only one highly relevant study could be identified, which tried to study the competences needed for successful entrepreneurial action based on recent years' feedback and personal opinions of entrepreneurs and students. In their study, Řehoř et al. (2020, p. 133) entrepreneurs and students evaluated six selected entrepreneurial competences and "intent creation" according to their perceived relevance of the respective competence. As a result, risk tolerance, opportunity recognition, and creativity were rated the highest among entrepreneurs. On the contrary, students indicated problem-solving, creativity, and communication as the most important competences for entrepreneurship.

Another attempt to identify competences and rank them according to their relevance can be found in (González and Wagenaar, 2006). It is important to note that the generic competences mentioned in the ranking highly correspond to the entrepreneurial competences presented by Mitchelmore and Rowley (2010); Bacigalupo et al. (2016); Tittel and Terzidis (2020). Among the top 10 competences on the list, the following competences highly relevant for entrepreneurship can be found: The capacity to learn, problem-solving, information and management, the ability to work autonomously, teamwork, organization and planning, communication, interpersonal competences, and take decisions. Moreover, critical entrepreneurial competence, such as leadership, is also reflected in the list.

<b>Author</b>	<b>Type of research</b>		<b>New competences</b>
Cury and da Silva Veiga (2021)	Systematic Literature Review	Literature on Entrepreneurial Competences;	No. Focus on entrepreneurial competences in entrepreneurship education
David (2021)	Diploma thesis using case studies;	Educational Context	No. Focus on intrapreneurship Education - Recommendations for action to design a curriculum for universities
Fagadar et al. (2021)	Bibliometric study;	Educational Context	No. Focus on curriculum development on intrapreneurship
Ferreira et al. (2021)	Quantitative study;	Educational Context	No. Focus on experience of entrepreneurs

*Continued on next page*

Table 5.2 – continued from previous page

<b>Author</b>	<b>Type of research</b>	<b>New competences</b>
Ferreras-Garcia et al. (2021)	Quantitative study; Educational Context	No. Focus on individual and contextual antecedents of entrepreneurship for starting a venture. Semi-structured interviews with 15 entrepreneurs
Handayani et al. (2020)	Quantitative study; Vocational Education and Training	No. Focus on competence development and determination of entrepreneurial interest in a culinary business management course
Justus (2021)	Quantitative study; Academic entrepreneurship education	Focus on gender-specific differences amongst potential entrepreneurs
Kassai (2021)	Ph.D. Thesis using Case Study	No. Focus on entrepreneurial leadership competence
Martínez and Muñoz (2021)	Quantitative study; Educational Context	(-). Proposes course model based on 400 opinions of students from Tecnológico de Monterrey in Mexico City
Michaela (2021)	Quantitative study; Educational Context	No.
Nikkola (2020)	Thesis using action research; Educational Context	Focus on the entrepreneurial mindset in the Degree Program of Traffic and Transport Management, at the Häme University of Applied Sciences, HAMK
Purwaningtyas et al. (2021)	Quantitative study; Vocational Education and Training	No. Focus on food service business management

*Continued on next page*

Table 5.2 – *continued from previous page*

<b>Author</b>	<b>Type of research</b>	<b>New competences</b>
Řehoř et al. (2020)	Quantitative study; Educational Context	No. Determines opinions on the most important competences that entrepreneurs need to start their business
Šlogar et al. (2021a)	Quantitative study; Educational Context	No. Focus on the development of entrepreneurial competences within entrepreneurial education programs
Šlogar et al. (2021b)	Quantitative study; Educational Context	No. Focus on self-assessment of student's entrepreneurial competence
Sołtysik et al. (2020)	Quantitative study; Educational Context	No. Focus on project management competence
TALJAARD (2020)	Ph.D. Thesis using literature review and Delphi Study and quantitative methods	No. Determines the relationship between entrepreneurial competences, entrepreneurial absorptive capacity and innovation capacity
Tamberg et al. (2021)	Qualitative study: Relational linguistic analysis and conceptual analysis	No. Linking project management and entrepreneurship
Um et al. (2021)	Quantitative study	No. Impact of governmental support programs on satisfaction level
Vali and Frăsineanu (2020)	Conceptual work; Educational Context	No. Analysing skills relevant for the 21st century
Zakrzewska et al. (2020)	Systematic literature review; innovation projects in companies	Personal Integrity and Reliability; Self-reflection . Focus on managerial competence

*Continued on next page*

Table 5.2 – continued from previous page

Author	Type of research	New competences
Łopatka (2021)	Quantitative study	No. Focus on Female Entrepreneurship and competences for ICT start-ups

Table 5.2: Results from forward citation of Tittel and Terzidis (2020)

### 5.3 Methodology

A qualitative text and content analysis was employed as a systematic approach to analyzing data through coding and quantifying relevant statements about entrepreneurial competences and activities and critical challenges of venture projects. Qualitative research methods were performed to verify and enrich phenomena mentioned in the interviews using deductive and inductive coding (see fig. 5.1). According to Gephart Jr (2004), qualitative research

"(...) provides a narrative of people's view(s) of reality and it relies on words and talk to create texts. Qualitative work is highly descriptive and often recounts who said what to whom as well as how, when, and why" (p. 455).

In qualitative research, several criteria have been established to ensure the trustworthiness of research results. The earliest criteria formulation goes back to Guba (1981); Guba and Lincoln (1989). According to the authors, the following criteria are vital to ensure high-quality naturalistic inquiries. The following criteria are meant to mimic quality criteria established in quantitative research:

- *Credibility* (comparable with internal validity) describes how the researchers can establish confidence "in the "truth" of the findings of a particular inquiry (...)" (Guba, 1981, p. 79).
- *Transferability* (comparable with external validity) requires the researcher to provide substantial information and details about the specific research case and determine "the degree to which the findings of a particular inquiry may have applicability in other contexts or with other subjects (...)" Guba (1981, p. 80). "Transferability refers to the generalizability of inquiry" (Tobin and Begley, 2004, p. 392).
- *Dependability* (comparable with reliability) allows the reader to understand the research steps, their results and decisions taken in the category formation. Moreover, according to Bitsch (2005), dependability refers to "the stability of findings over time" (p. 86).

- *Confirmability* (comparable with objectivity or neutrality) requires the transparent presentation of the data, its sources and how the data was used and transformed into the presented findings. Other researchers should be able to reproduce and confirm the research findings. Confirmability is “concerned with establishing that data and interpretations of the findings are not figments of the inquirer’s imagination, but are clearly derived from the data” (Tobin and Begley, 2004, p. 392).

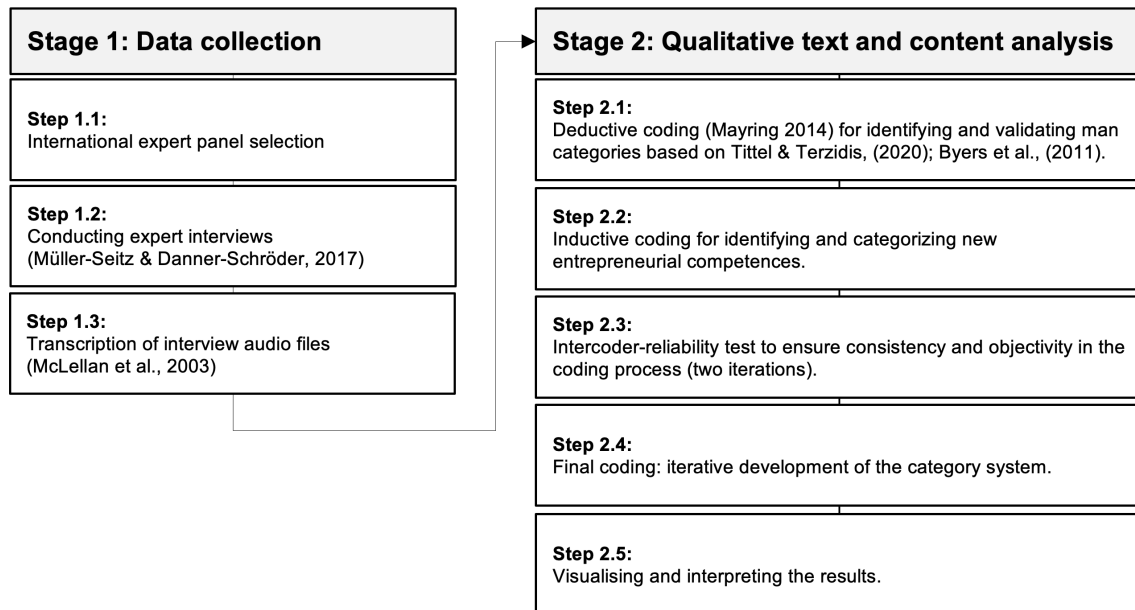


Figure 5.1: Research process and methodology applied in the study.

To meet the quality criteria and provide reliable research results, the research methodology and analytical processes applied in this study are presented in figure 5.1 and the subsequent sections. For qualitative research, Sampieri (2018) recommends an appropriate sample size of 20-30 participants. The study is based on 26 qualitative semi-structured interviews with international experts in entrepreneurship and entrepreneurship education and founders of venture projects. The study aims to present insights and expert knowledge from the stakeholders and reveal their expertise on critical entrepreneurial competences needed by entrepreneurs in their early stages.

### 5.3.1 Interview panel selection criteria

Conducting interviews is a standard method for exploratory studies to understand the research field in-depth. In this context, interviews represent a verbally conducted interaction between the researcher and the interviewee (Gephart Jr, 2004; Kaiser, 2014). To define the expert panel, the entrepreneurial ecosystem model by Isenberg (2011) was used to

select relevant domains, interview partners, and consider their involvement and expertise. According to Isenberg (2011), an entrepreneurial ecosystem includes seven fields: Policy, markets, human capital, support, culture, and finance. Based on that, experts in the "support domain" could be identified and acquired for the interviews (see table 5.3). To choose experts from different fields and get a representative view on the topic, the following selection criteria were applied:

- Interview partners are experts in one of the domains: entrepreneurship education, startup mentoring and consulting, financial support and investment of start-ups in their early stage, innovation management in established organizations with focus on intra- or entrepreneurship.
- Experts, mentors, and consultant have a strong expertise in the field of entrepreneurship (min 3 years of experience, direct and personal contact to entrepreneurial teams).
- Entrepreneurs are founders or co-founders of an active and future-oriented venture project.

The group of entrepreneurs is characterized in more detail. To keep and maintain confidentiality, only general information can be provided. F1 is the founder of a tech company developing microchips in the semiconductor industry. F2 develops health-oriented food and drinks in the food industry. The team has been successfully operating since 2014. F3 develops IT products in the music industry using enhanced algorithms, successfully operating since 2016. F5 is the founder and CEO of a transportation company in the mobility industry. F6 is a co-founder and CEO developing translation technology in the IT industry. F7 develops an IT product in the mobile games industry. F8 runs an online shop in the retail industry. F9 is a founder and CEO of an agency for digital commerce in the consulting industry. F10 develops products and physical components in the Life Science industry. F11 provides an IT product and consulting service in the agriculture industry.

<b>Nr.</b>	<b>ID</b>	<b>Role/ Position</b>	<b>Category</b>	<b>Location</b>
1	F1	Co-Founder	Entrepreneur	Eindhoven, Netherlands
2	F2	Co-Founder and CEO	Entrepreneur	Karlsruhe, Germany
3	F3	Founder and CEO	Entrepreneur	Karlsruhe, Germany
4	F5	Founder and CEO	Entrepreneur	Berlin, Germany
5	F6	Co-Founder and CEO	Entrepreneur	Berlin, Germany
6	F7	Co-Founder and CEO	Entrepreneur	Frankfurt, Germany
7	F8	Founder and CEO	Entrepreneur	Karlsruhe, Germany

*Continued on next page*

Table 5.3 – *continued from previous page*

Nr.	ID	Role/ Position	Category	Location
8	F9	Founder and CEO	Entrepreneur	Karlsruhe, Germany
9	F10	Co-Founder and CEO	Entrepreneur	Karlsruhe, Germany
10	F11	Co-Founder and CEO	Entrepreneur	Karlsruhe, Germany
11	U1	Professor for Social Entrepreneurship	Lecturer	Tallinn, Estonia
12	U2	Lecturer in a Venture Program	Lecturer	Helsinki, Finland
13	U3	Director of Center for Entrepreneurship	Lecturer	California, USA
14	U4	Professor for Technology Entrepreneurship	Lecturer	Helsinki, Finland
15	U5	Head of Microsystems Technology Division	Lecturer	Karlsruhe, Germany
16	C1	Investment Manager	Consultant	Helsinki, Finland
17	C2	Head of Coaching and Finance	Consultant	Stuttgart, Germany
18	C3	Head of Business Development	Consultant	Karlsruhe, Germany
19	C4	Start-up Consultant	Consultant	Karlsruhe, Germany
20	C5	Start-up Consultant	Consultant	Karlsruhe, Germany
21	C6	Start-up Consultant	Consultant	Helsinki, Finland
22	C7	Start-up Consultant	Consultant	Walldorf, Germany
23	I1	Vice President Innovation Hub	Company expert	International company. Headquarters in Germany
24	I2	Head of Innovation Management	Company expert	International company. Headquarters in Germany
25	I3	Managing Director	Company expert	International company. Headquarters in Germany
26	I4	Managing Director	Company expert	Karlsruhe, Germany

Table 5.3: Panel of experts, educators, and entrepreneurs who participated in the interviews.

### 5.3.2 Data collection

The interviews were conducted via telephone or in person during 2017 and 2020. The length of the interviews varies between 20 and 90 minutes. According to the context and

the interview partner, interviews were performed in German and English. Interviews were recorded on an mp3 audio file for further analysis and transcription. The interviews were performed based on the structure suggested by Müller-Seitz and Danner-Schröder (2017): I) Introduction of interview partners, presenting the aim and background of the study, and the utilization of the data, II) Request to record the interview and ensure data protection agreement, III) Interviewing the partners with a focus on entrepreneurial activities, main challenges, and required competences for successful realization of the venture projects, IV) Providing the option for further questions and comments. To address the research questions, the following guiding questions were discussed with the interview partners:

- Please reflect on the key challenges of entrepreneurs in their early stage!
- What are entrepreneurial competences from your perspective?
- What are the most important entrepreneurial competences/skills/abilities of entrepreneurs in their early stage in your opinion?
- What are the key success factors for entrepreneurs in their early start-up phase?
- From your point of view, which competences relevant for entrepreneurship should be developed in entrepreneurship education?

In total, 26 interviews with entrepreneurs (n=10), lecturers (n=5), consultants and mentors (n=7), and company experts (n=4) were conducted to explore entrepreneurial competences further and gain more comprehensive insights into the research topic. To ensure robust and valid data collection and documentation of research, the interviews were audio-recorded and transcribed by the guidelines suggested by McLellan et al. (2003). As a result, the data includes 219 pages of transcripts and 142.507 words.

### **5.3.3 Research questions**

To meet the objectives of the study, the following research questions are formulated:

- RQ 1: Which challenges do entrepreneurs face in their early stages?
- RQ 2: Which competences are considered to be essential from a practitioner's point of view?
- RQ 3: What are the implications for entrepreneurship education?



Concerning RQ1 and the study by Edelman et al. (2008), a comparison of competences mentioned by practitioners and scholars can identify gaps and overlaps between theory and practice. Therefore, a sub-question is: Which entrepreneurial competences are considered vital by entrepreneurs and practitioners which are not listed in the literature (see reviews by Mitchelmore and Rowley (2010); Tittel and Terzidis (2020) (SQ1.1)?

## 5.4 Qualitative text and content analysis

### 5.4.1 Category definition

The data was qualitatively examined by the rules of the qualitative content analysis suggested by Mayring (2010, 2014). The category definition is an essential analytical step in qualitative analysis. It serves as a selection criterion to determine the relevant material from the texts (Mayring, 2014). A deductive approach was chosen for the initial development of a category system. The categories developed by Tittel and Terzidis (2020) and a definition of the entrepreneurial activities by Byers et al. (2011) were used as an initial framework and selection criteria. For the definition of main categories, Tittel and Terzidis (2020) suggest three types of competences: Domain competence, personal competence, and relationship competence (see table 5.4). Domain competences are the core knowledge, skills, and attitudes needed in a specific discipline (domain), such as health care, law, education, or entrepreneurship. Personal competence can be described as organizing oneself, acting autonomously, setting goals, and regulating behaviour and emotions. It addresses processes within the individuals and is therefore referred to as intrapersonal competence (National Academies, 2012). Social competence, on the other hand, "describes a person's ability and readiness to work together with others in a target-oriented manner, understand the interests and social situations of others, deal with and communicate with others in a rational and responsible way (...)" (DQR, 2011, p. 16). Table 5.4 presents the main categories and their definitions based on Tittel and Terzidis (2020, p. 23). To define potential sub-categories for the domain competence, a prominent definition by Byers et al. (2011) was used. It describes the main activities of entrepreneurs and can be therefore considered a main characteristic of entrepreneurship. According to the authors,

*"Entrepreneurs identify opportunities, mobilize resources, execute on their vision and manage risks" (pos. 497).*

That conceptualization provides clear guidance in the analytical process of content analysis and serves as an initial category system for deductive category formation and evaluation. Based on the four entrepreneurial activities and the sub-categories derived from

Byers et al. (2011), a code book (see table 5.6) was developed to guide the deductive text analysis process.

Main Category	Description
Domain competence	"Domain competence encompasses knowledge, skills and attitudes that constitute the disposition to process tasks in an autonomous, professionally appropriate and methodical manner and to evaluate the result".
Personal competence	"Personal competence describes a person's disposition to develop further and to shape his or her own life autonomously and responsibly within the particular social, cultural or occupational context".
Social competence	"Social competence describes a person's disposition to work together with others in a target-oriented manner, understand the interests and social situations of others, deal with and communicate with others rationally and responsibly and be involved in shaping the world of work and the life-world".

Table 5.4: Code book for main categories. Source: (Tittel and Terzidis, 2020, p. 23)

## Identify opportunities

The first activity and sub-category is "Identify opportunities", which refers to opportunity recognition. "Opportunity recognition — one of the central ideas of entrepreneurship — is the ability to identify a good idea and transform it into a business concept that adds value and generates revenues" Lumpkin and Lichtenstein (2005, p. 457). Kuckertz et al. (2017) presents activities related to both opportunity recognition and exploitation (see table 5.5).

Opportunity Recognition	Opportunity Exploitation
Searching	Understanding customers and market
Being alert	Planning the business
Gathering information	Acquiring human resources
Communicating	Setting up the organization
Addressing customer needs	Developing a product or service
Evaluating	Gathering resources

Table 5.5: Entrepreneurial activities related to opportunity recognition and exploitation. Source: Kuckertz et al. (2017)

## **Attract resources**

Entrepreneurs need to acquire resources to operate their businesses. Essential resources are part of the Business Model Canvas by Osterwalder and Pigneur (2010). They include qualified co-founders and team members, personal and professional networks (human resources), funding and investment capital (financial resources), as well as machinery and production facilities (physical resources). Another categorization is presented in Byers et al. (2011) by different forms of capital: Intellectual capital (human capital), Financial capital (money, bonds & securities), and Natural capital (raw materials, energy, pollution absorption capacity, and land).

## **Execute on their vision**

The relevance of a clear vision in entrepreneurship was recognized by Sarasvathy (2002); Boyatzis and Soler (2012). The positive effect of a clear vision has been known to affect behaviour in different domains such as sports psychology (Loehr et al., 2005), medical treatment (Roffe et al., 2005), musical performance (Meister et al., 2004), and academic performance Curry et al. (1997). A vision is defined as "A picture or a view of the future. Something not yet real, but imagined. What the organization could and should look like. Part analytical, part emotional." (Thornberry, 1997, p. 28). Also, as "(...) future-oriented image of the new venture, intended to motivate both the entrepreneurs and their followers (investors, future employees) toward this desirable future" (Ruvio et al., 2010, p. 145). It, therefore, implies that entrepreneurs need to develop a clear, desirable, and inspirational vision (Ruvio et al., 2010) and take action for its realization.

## **Manage risks**

New venture creation is characterized by high uncertainty and risks. Risk management, therefore, is essential and includes the identification, analysis, prioritization, treatment, and monitoring of the risks that may occur in entrepreneurship (Hillson, 2002; Culp, 2002; Tummala and Burchett, 1999). Based on the sub-categories derived by Byers et al. (2011) and presented above, the description and reference example is provided in table 5.6.

### **5.4.2 Iterative coding of text material**

As a next step, Mayring (2014) suggests analyzing the text material line by line and identifying text segments that fit the pre-defined category system and its definitions. During that process, the initial category system can be re-defined and adapted. Moreover, new categories can emerge and be defined with insights from the text material. The coding procedure

was performed iteratively. After replaying the audio files and reading the transcripts, the researcher coded 20 % of the text material by carefully comparing and consolidating the text passages with the initial codes and definitions. As a result of the first coding loop, the initial category system's abstraction level was adjusted, and the coding procedure was adapted. The following excerpt illustrates a coding example of the interview text segments for "Being passionate" (yellow), "Develop a vision" (red), and "Persistence" (green):

*"The first thing is that you're really **passionate** about what you do and what you actually want to achieve– the thing that you have a strong **vision** : I really want this to happen. And that's the first thing that you do when you wake up. You're like, ok, now I want to put more time into this and I want to do this and I want to do that" C6. p. 10.*

*"An entrepreneur to me is someone who is rather obsessed with an idea or a **vision** , and **does everything for it and keeps trying, keeps getting up** when something doesn't work until he achieves it" F6, p. 59.*

Sub-Category	Description
Identify opportunities	Includes activities related to early-stage activities in venture creation, such as gathering relevant information about the industry, market research, idea generation, visioning, talking to potential customers to understand their needs, trend analysis and observation.
Attract resources	Includes activities related to the identification and acquisition of human, financial, and natural resources to operate the firm successfully.
Execute on the vision	Includes activities related to the definition of business vision and future-oriented goals as well as strategies for execution and implementation to execute the goals and vision.
Manage risks	Includes activities related to the identification, assessment, and management of risks and potential issues.

Table 5.6: Code book for sub-categories

### 5.4.3 Revision of categories

After the initial coding, the text body, category system, and definitions were reviewed and discussed with a second researcher from the field. The category system and the degree of generalization were adapted to meet the research objectives. In addition, an inter-coder

reliability test was performed to detect inaccuracies and potential sources of errors. Inter-coder reliability's first loop was insufficient (Cohen's Kappa = 0.43). Inaccuracies and misinterpretations of statements were addressed and resolved. The coding strategy and logical algorithm were prepared for the final coding loop.

#### **5.4.4 Final coding**

The text material was coded line by line based on the code book and the defined coding strategy. Relevant text segments were identified, highlighted, and assigned to the respective codes and themes. New codes and relevant topics were identified during the coding process and added to the initial category system (inductive coding). As a result of the qualitative deductive and inductive coding process, three main categories and four sub-categories could be confirmed. The categorization of the competences was critically analyzed and re-grouped into a final category system.

#### **5.4.5 Inter-coder Reliability**

Well-designed research studies must include procedures to measure the inter-coder reliability, which is defined as "the extent of agreement among data collectors" (McHugh, 2012, p. 276). A second researcher performed an inter-coder check based on the developed code system, the coding algorithm, and the codebook. Mayring (2014) suggests using at least ten per cent of the underlying data material as a sample for analysis to perform an inter-coder test. This study used 20% of the transcribed interviews to review and calculate the inter-coder reliability. In a third coding loop, the relevant text passages were coded again by the second coder. To check both files, the coded documents of both coders were uploaded into the same MAXQDA project to use the inter-coder match calculation. That step involved checking whether the coders assigned the same code to the same passages in the text. The recommended percentage value of 90 was set, at which the two coded text passages were evaluated as a match. As a result, the texts were coded with sufficient inter-rater reliability values (Cohen's kappa) between 0.87 and 0.85. Thus, a relatively consistent coding was recorded (see fig. 5.2).

### **5.5 Results of the qualitative text and content analysis**

The qualitative analysis's code system includes 1304 codes structured and subdivided into sub-codes, codes and main categories. The qualitative analysis confirms the structure of the category system and reveals eight new relevant competences and ten critical character traits (see table 5.7). Character traits were not included in the initial list since the previous

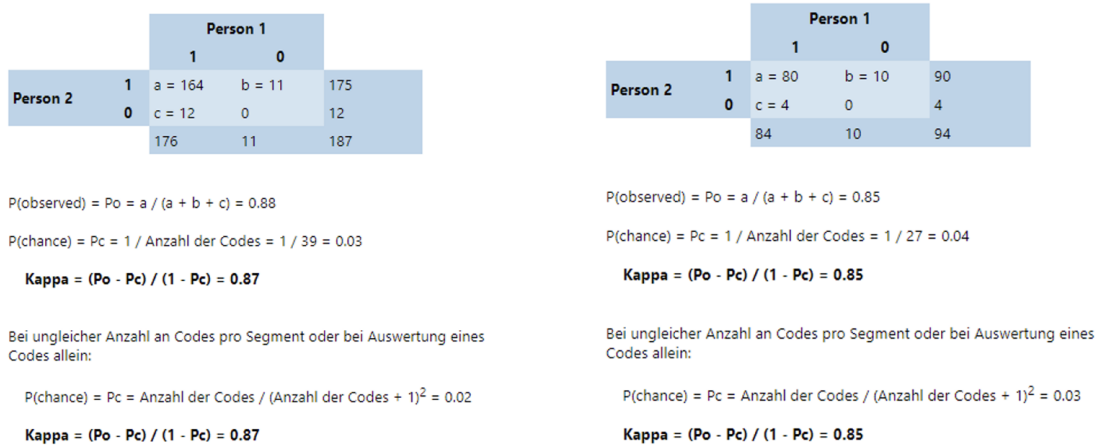


Figure 5.2: Inter-coder reliability test for interview C2 (left) and U2 (right)

analysis only focused on competences. However, character traits have a long tradition in entrepreneurship research (see Judge et al. (1999); Gartner (1989); Rauch and Frese (2007)) and have been reported to have a positive relationship with entrepreneurial success (Leutner et al., 2014; Brandstätter, 2011). A compilation and ranking of the competences identified by the deductive and inductive coding strategy is presented in figures 5.3 (domain competence), 5.4 (personal competence), and 5.5 (social competence).

## 5.6 Discussion

The research was motivated by the research questions presented in 5.3.3. Referring to research question 1 and 2, a list of entrepreneurial competences was developed based on interviews with entrepreneurs, entrepreneurship educators, company experts, and mentors. The list was organized in a category system using three main categories: Domain competence, personal competence, and social competence, and four sub-categories derived from the definition of entrepreneurial activities by Byers et al. (2011): Identify opportunities, execute on the vision, attract resources, and manage risks.

As a result, the topics and competences such as "research and analyze the market", "sell your products and services", "acquire financial resources", "develop a team", "acquire knowledge", "communicate", "inspire and motivate others", and "build networks" could be identified as the most often mentioned competences relevant for entrepreneurial activities. Communication and building personal and professional networks are categorized as social competence and are among the top three entrepreneurial competences. Referring to the content and teaching methods presented by Sirelkhatim and Gangi (2015), relevant entrepreneurial competences addressed and developed in practice-oriented entrepreneurship education (for E-Ship) could be confirmed: Networking, product development, opportunity

recognition, and idea generation. The qualitative text analysis revealed 22 new competences and nine personal characteristics not included in the entrepreneurship competence framework by Tittel and Terzidis (2020) (see table 5.7). As a result, 39 entrepreneurial competences could be identified, represented in the Entrepreneurial Competence Framework by Tittel and Terzidis (2020) and the expert interviews. A comprehensive list of the entrepreneurial competences derived from the expert interviews compared to the Entrepreneurial Competence Framework is presented in the appendix.

<b>Nr.</b>	<b>Entrepreneurial Competence</b>	<b>#</b>	<b>Personal characteristic</b>	<b>#</b>
1	Use methodological knowledge	(40)	Be resistant to failure	(9)
2	Persevere	(36)	Be trustworthy	(8)
3	Attract customers	(35)	Be and act efficient	(7)
4	Validate customer needs	(25)	Be and act independent	(7)
5	Motivate yourself	(24)	Be helpful	(6)
6	Develop a business model	(17)	Be persistent	(4)
7	Use and apply technology	(17)	Have a high quality awareness	(1)
8	Deal with failure	(16)	Be and act self-confident	(1)
9	Set organizational goals	(16)	Be patient	(1)
10	Deal with uncertainty	(16)		
11	Reflect	(15)		
12	Take feedback	(14)		
13	Solve conflicts	(14)		
14	Manage organizational growth	(13)		
15	Manage projects	(13)		
16	Validate your business idea	(10)		
17	Think critically	(9)		
18	Plan market entry	(7)		
19	Act efficiently	(7)		
20	Act independently	(7)		
21	Create value	(6)		
22	Act trustworthy	(5)		

Table 5.7: Entrepreneurial competences and personal characteristics identified in the study which are not mentioned in the competence framework derived in the literature review by Tittel and Terzidis (2020).

Entrepreneurs and consultants agree on the importance of competences and key entrepreneurial activities such as building a team, acquiring financial resources, researching and understanding the market, building networks, and developing a marketing strategy.

From their point of view and their practical experience in consultations, consultants focus on the business plan and marketing strategy development, whereas entrepreneurs highlight self-motivation and problem-solving. In addition, the entrepreneurs mentioned project management, self-organization, idea and task implementation, creativity, and enthusiasm. On the other hand, consultants stressed that acting ethically correct, overcoming challenges, adapting to changes, and acquiring market knowledge are vital activities that entrepreneurs need to deal with. From their experience, mentoring and supporting teams, consultants also mention the necessary fit between the entrepreneurial team and the market, dealing with uncertainty and developing resilience. It is also worth noting that the consultants most often mentioned acquiring financial resources.

From the consultants' perspective, specific topics and aspects are acting ethically, developing strategies to overcome challenges, adapting to changes, and acquiring market knowledge. According to the entrepreneurs, on the other hand, project management, self-organization, and being enthusiastic about the work are critical aspects not mentioned by the consultants. In addition, entrepreneurs mention mental strengths, persistence (getting up after failure), and being open to helping team members, colleagues, and partners. As presented above, activities such as structuring information for decision-making, working, and being independent and creative are also included in the list of relevant activities.

Entrepreneurs are more performance-oriented, indicating competences such as structuring tasks and information to make decisions, creating business scenarios, and using creativity to develop realistic and viable business ideas. For that, finding the right team is an essential task for entrepreneurs.

Company experts and entrepreneurs also have several shared critical competences needed for entrepreneurial action. Together, company experts and entrepreneurs highlight operative and highly practice-oriented activities, such as team building and recruitment of team members, market research, network development, and the ability to sell products and services. However, company experts mention challenges such as dealing with uncertainty, developing market knowledge, and using digital ecosystems and platforms. On the other hand, entrepreneurs need to motivate and inspire themselves and their team members, take risks, acquire financial resources, and set organizational goals.

Both educators and entrepreneurs agree on relevant activities such as team building and recruitment of team members, self-motivation, customer validation, the acquisition of financial resources, and the ability to sell products and services. According to the number of codes in the lecturers' group, the focus of the interview participants is on customer validation. On the other hand, entrepreneurs again highlight the importance of team members' right constellation and effective collaboration. Activities and aspects mentioned only by the lecturers are: being able to innovate, finding the problem-solution fit, trend analysis, and getting things done. Entrepreneurs, on the contrary, perform market research activities, collect information,



build and use personal and professional networks, communicate with their stakeholders and team members, manage projects, and set organizational goals. Also, practice-oriented activities such as task and human resource management, idea implementation, and knowledge acquisition are on their list.

The domain competence shows a heterogeneous profile when considering the competences mentioned by the interview partners. Significant differences between entrepreneurs and educators in the context of the domain competence can be found in "Finding the right team." Moreover, there is a gap in "Research and analyze the market," "Validate customers' needs," and "Use methodological knowledge." Start-up consultants also highlight the critical role of the right entrepreneurial team, financial resources, and sales. In addition, critical differences between educators and entrepreneurs can be observed in the personal competence category. "Inspire and motivate others" is often mentioned by entrepreneurs but often not considered by lecturers. "Dealing with failure," on the other hand, was highlighted most by company experts, significantly less considered by the lecturers. The company experts particularly stress the role of communication, while educators almost do not have it on their radar.

### **5.6.1 Build your team**

According to entrepreneurs, having the right team, developing and using professional and personal networks, and inspiring and motivating team members are critical activities that require the right competences. As mentioned above, personal and professional networks can help to connect entrepreneurs with lead customers, users, new customers or even future team members and co-founders (C2, p. 8). Therefore, a well-prepared pitch or a convincing company and self-presentation within the network can be decisive in convincing potential investors and business angels to invest in the start-up and provide financial resources (F7, p. 46). After a network has been established, interpersonal relationships should be maintained to sustain the network. A well-established empirical and practical evidence in entrepreneurship is that the entrepreneurial team and founders' complementary competence sets play a significant role in the success and the performance of a business venture (Kalyanasundaram, 2018; Feinleib, 2011; Mikle, 2020). For that reason, the insights from interviews are presented in more detail. The code "Team building" is divided into two sub-codes: Team formation and recruiting team members. Team building is described in the interviews as the compilation of people into a well-functioning team who have specific competences and thus can successfully implement the company goals (C7, p.18; F7, p.11; F7, p. 32; U2, p. 6; U3, p. 6; C5, p. 62). The team members should have various qualifications that complement each other (F2, p. 21; F2, p. 59; F6, p. 22). Diverse competences must be available in a team to cover the necessary competences to develop a product or service and solve a business

problem (C1, p. 25; C3, p. 32). However, often entrepreneurs are not fully aware of their team competence set (C3, p. 38).

An entrepreneur should be able to develop a heterogeneous team with different competences and consolidate their role (F10, p. 29; U5, p. 74; C4, p. 12; I4, p. 2). "It is like a marriage in the end" (F9, p. 49). As a challenge, two interviewees described the case where the founding teams started with only developers with solid technical expertise. However, they lacked the economic side of a business entirely, and therefore at least one team member with a business and management background to take over sales or market research for the initial phase (F9, p. 35; I4, p. 2). As a counter-example, one interviewee observed that the motivated business economists who had an excellent idea to develop an app lacked the developer to program the app (C3, p. 36). Finding co-founders or being aware that you need complimentary human resources is critical. The interviewees see these aspects as a significant challenge since it is in the team-building stage that many teams fail (C6, p. 10; F10, p. 29). According to a founder and a lecturer, having the right team is a success factor for venture projects (F9, p. 75; U3, p. 6). Especially in the stage of start-up growth, the competence to form and build a team is needed (C3, S. 26). In this phase, external supporters can also be brought in to learn from (C2, p. 10; C6, p. 12).

## **5.6.2 Communicate**

Communication is a key social competence for entrepreneurs. 19 of 26 interviewees stated that the founder's communication abilities are essential. It is worth mentioning that communication is the second most frequently mentioned competence in the underlying content analysis. Four people emphasized the importance and ability to speak openly and freely (F6, p. 8; F9, p. 35; C3, p. 42; I3, p. 42). To speak openly with the team, partners, co-founders, and external stakeholders, such as potential customers, includes being straightforward, honest, and transparent in the communication (C3, S. 42). "There are certain principles in communication, you can read about. You can study books- there are many good books- but of course, it is difficult if you do not apply it directly". Therefore, it is essential to note that applying theory is key to developing a competent practice (F5, S. 48).

Having the ability to express thoughts and ideas to a specific target group in simple words is part of communication competence and helps get in contact with people and build networks (F10, p. 29; F10, p. 35; C2, p. 14; C3, p. 18; C5, p. 28; I2, p. 24; I3, p. 19). The entrepreneur should be eloquent (F3, p. 78; F5, p. 8; F5, p. 20; F6, p. 9- 10; C3, p. 18). At the same time, communication includes listening to others and getting relevant information from your communication partners (F2, p. 81). By listening carefully, signals and gestures of the other person can be analyzed and interpreted so that entrepreneurs can conclude their actions and thoughts. Moreover, entrepreneurs can demonstrate the strength of their argumentation

(F2, p. 83; I2, p. 8). In this context, the interviewee noted that proper articulation is also crucial (I2, p. 8).

Eight interview partners mentioned that communication is the first competence you need to have a fruitful conversation with your customers (C7, p. 2). Entrepreneurs should present the start-up attractively and excitingly to raise potential customers' interest (C5, p. 28; I3, p. 5). A start-up consultant highlighted this factor as "[...] really underestimated by most people (C3, p.38). According to the interviewees, an entrepreneur should start with the conversations in the early phase of the start-up development to convey appreciation through listening to the problems of potential customers (F2, p. 25; F2, p. 59; C7, p. 18; F11, p. 18; C3, p. 14). The entrepreneur can generate adequate solutions to the problems derived from the interviews (U3, p. 6; C3, p. 8). Another aspect is communication with team members (C7, p. 18; F5, p. 44; F5, p. 55; F6, p. 54; C3, p. 42). Entrepreneurs must inform their employees about the latest updates on the start-up and its environment in joint and regular meetings (F5, S. 8; F6, S. 8). Talking to investors and negotiating in the early phase is another aspect of communication (C2, p. 10). Therefore, entrepreneurs should have learned how to deal with investors, develop and pitch their business vision and present their company progress (F8, p. 43; C3, p. 42).

### 5.6.3 Inspire and motivate

To have a strong inspiration and motivation to execute the vision is essential for entrepreneurs. Entrepreneurs should maintain their optimism and focus on the positive aspects of situations (F5, pp. 26-28; F11, p. 20; U4, p. 10) to foster and uphold their motivation and motivate others. For that reason, the entrepreneur's self-motivation is important (F1, p. 4; F7, p. 39; F8, p. 14; F8, p. 52; F9, p. 62; U5, p. 37). In addition to that, many interview partners addressed the fact that entrepreneurs need a strong inner drive and a high level of energy to work hard and adapt to changes and new challenges (F6, p. 57; F7, p. 39; F8, p. 8; F11, p. 16; C3, p. 20). Entrepreneurs not only need to motivate themselves to accomplish tasks and master key challenges. They also need to motivate and inspire other people in their social environment, such as team members, lead customers, potential investors, and partners. More than half of the interviewees mentioned several times that entrepreneurs should be curious and be able to inspire and motivate colleagues, partners, and team members with the ideas and visions they live for and work on (F3, p. 79; F10, p. 34; F11, p. 20; U5, pp. 46-47; C6, p. 10). Two interviewees explicitly addressed that these competences would shape the leadership of a start-up. Moreover, it ensures that the start-up team believes in the same goals so that the team members can follow the same visions (F11, p. 26; C3, p. 28). Since entrepreneurs often start with a vague idea of a potential business solution, they are expected to have a particular enthusiasm to follow and realize their ideas (F9, p. 26; F11, p. 20; C1, p.

23) and to be able to convince the team members of the business vision (F10, p. 15; F10, p. 30).

#### **5.6.4 Persevere and persist**

The interview partners predominantly use perseverance, assertiveness, persistence, and the will to perform. Entrepreneurs should persevere and focus on their goals to avoid distraction (C2, pp. 39-41; C4, p. 33; F7, p. 19; F11, p. 20). According to the interviewees, entrepreneurs are successful when they pursue their goals with an inner determination not to give up and keep trying (F7, p. 19; C3, p. 20). Thus, entrepreneurs need the willpower and motivation to realize their visions (U5, p. 98; I2, p. 8; I4, p. 2). Nevertheless, entrepreneurs should remain clear and realistic, knowing when to pivot (F9, p. 82). In this regard, an interviewee mentioned several times that a primary challenge of entrepreneurs is dealing with drawbacks and trying to overcome obstacles actively (C1, p. 21; C3, p. 18; C3, p. 22; C3, p. 26). The will and ability to change and adapt strategies to new circumstances are essential components to pursuing initial goals and improving products and services (F11, p. 24; U5, p. 37; U5, p. 43; C4, p. 24). Moreover, the strength and ability to implement plans and ideas with the team members are essential (F7, p. 10; F8, p. 54; F10, p. 15). Based on the interviewees' answers, it can be summarized that in implementing an idea to an ultimate result, entrepreneurs should be resilient, persistent and persevering while striving for entrepreneurial success (C3, p. 18; C4, p. 6).

#### **5.6.5 Build networks**

The category "Building networks" includes finding, accessing, building, and using professional and personal networks and establishing personal relationships with other people. It, therefore, has a significant role in the relationship competence category. Here, it is the second most frequently mentioned competence. Established and effective business networks open new perspectives and help entrepreneurs reach their entrepreneurial goals more quickly to grow in the long term and make their businesses successful (F2, p. 25; C2, p. 8; C3, p. 32). Therefore, founders, lecturers, and consultants noted identifying and accessing specific networks and making valuable connections to stakeholders is a key activity of entrepreneurs and a success factor (F2, p. 21; C7, p. 2; F2, p. 59; F8, p. 43; U2, p. 38; C2, p. 2; C3, p. 32; C5, p. 42). An example given by two entrepreneurs is when students start networking early by entering the start-up scene at their university (F1, p. 12; F3, p. 9). Moreover, a consultant commented that many start-ups start building networks too late (C3, p. 14). According to the interview partners, some founders neglect networking activities entirely (F3, p. 15; C5, p. 28; U2, p. 44; C2, p. 8).

Professional networks include experts, investors, potential partners, co-founders, and other start-up teams who can help overcome challenges and promote business activities. Therefore, the aim is to build a relationship with these contacts by using communication competence and empathy to get valuable information, resources, and other relevant opportunities for the start-up (F7, p. 44; F9, p. 40). Entrepreneurs look for possible relevant platforms and events to establish business contacts and access these networks. According to the interviewees, these can be conferences, talks, hackathons, a get-together for founders (F2, p. 15; F7, p. 30; U1, p. 20) or network events at universities and incubators (I2, p. 6). Those activities can support entrepreneurs in finding co-founders, potential investors, cooperation partners, employees, or lead customers (F3, p. 19; C7, p. 2; F7, p. 44; C3, p. 14; C4, p. 55). Furthermore, entrepreneurs should use desk research to identify event participants they will approach in advance and find out about their interests and activities to start a conversation quickly (F1, p. 8). Preparing in advance helps entrepreneurs to start conversations and build trust and connection with their interlocutors. Often the goal is to identify experts and successful entrepreneurs to gain insights into the markets (F2, p. 23; F2, p. 59; F6, p. 32). According to the interviewees, networking and knowledge exchange makes it possible to gain expert knowledge and exchange ideas with people who already have overcome obstacles and gained hands-on experience over a more extended period (F2, p. 29; F2, p. 59; F6, p. 32; F7, p. 46; F10, p. 29; C1, p. 6; C5, p. 28).

### **5.6.6 Validate customer needs**

Identifying and validating customer needs are the main competences highlighted by entrepreneurship educators. The success of a start-up depends on discovering a promising and viable business opportunity and the ability to address unmet customer needs (U2, p. 38). Therefore, the entrepreneur must determine the customers' needs before realizing a business idea to derive the requirements for a product or service (F1, p. 4). The interviewees emphasized that the goal is to better understand the customer by talking to them first. Thereby methodologies such as qualitative interviews with customers are carried out, in which entrepreneurs can ask questions to the target group (F3, p. 4; U2, p. 6; C6, p. 6). The evaluated conclusions drawn from the interactions with the customers and users serve as a solid foundation for developing the product or service (C7, p. 18; U2, p. 18; U2, p. 26; C3, p. 16).

### **5.6.7 Generate ideas**

According to the interviewees, entrepreneurs need to use their creativity to generate new business ideas that represent a valuable business opportunity (F2, p. 45; F9, p. 26; U3, p.

6; C5, p. 16; C6, p. 2). Two university lecturers mentioned that entrepreneurs use specific tools and methods, such as design thinking and value proposition canvas, to uncover the customers' needs and that different seminars and workshops are offered for this particular purpose (U2, p.32; U5, p.15). The entrepreneur generates ideas to provide a solution to the existing problems for the customer. From several ideas, the entrepreneur should be able to choose the best alternative. Along the way, the founder should be able to adjust and optimise the idea. It is crucial to start with an inspiring vision whereby the idea will continue developing. The requirement for change can be derived from customer needs and market information (F3, p.47; F10, p.17; C5, p.64; I2, p.6). In summary, generating ideas is the first and essential step in developing a venture project.

### **5.6.8 Validate your idea**

After generating a business idea, entrepreneurs should validate the idea on the market (C7, p. 2; C3, p. 42). To obtain honest and genuine feedback and suggestions for improving the idea, entrepreneurs should present their business vision to their social environment and discuss it with potential customers outside their inner circle (U1, p. 14). This feedback can then be critically assessed and reviewed for changes and improvements (F3, p. 47; F6, p. 36). By interacting with potential customers and users, there is a chance that the entrepreneur will learn that the product does not meet the users' requirements and does not provide good value to the customers. In that case, the entrepreneur would have to abandon the idea and devote himself to another idea performing a pivot (F10, p.19). On the other hand, it is possible that a product already exists on the market. Therefore, it is even more important to check the competitors and the market potential to guarantee long-term entrepreneurial success (C3, p. 46). It is essential to prove if the market would accept the idea and if customers would pay for the business solution (U1, p. 16). The idea is not validated until entrepreneurs will not find people willing to invest in the business idea or use the product or service.

### **5.6.9 Acquire financial resources**

Start-up consultants support entrepreneurial teams to overcome their challenges in the early stage of a venture project. Based on their experience with many teams and projects, consultants highlight the role of the right team and the acquisition of financial resources. Keeping a start-up on the market long-term and conducting entrepreneurial activities are complex tasks without resources and funding. Founders must be aware that obtaining funding usually takes a long time, and therefore expenses are unlikely to be covered by revenues (F8, S.10; U1, S.36). For this reason, several interviewees mentioned that raising funds and attracting investors is essential to prevent the start-up from failing and promote

growth (F2, p. 2; C1, p. 54; C2, p. 10; C3, p. 36; C4, p. 35). One consultant highlights that many founding teams do not make it through the first round of funding because they spend half a year focusing only on development which is the wrong approach (C3, S.14). Two interviewees state that founders use their capital or the financial help of family and friends to finance the start-up. Nevertheless, there are other forms of financing (U2, S. 38; C1, S. 21), such as funding programs and banks and investors' financial services (C5, p. 14; C6, p. 2; U3 p. 6). Many interviewees remarked that finding an investor is essential (F6, p. 6; F9, p. 45; C2, p. 2; C2, p. 30), and several highlighted that enthusiasm and positive trust are needed to persuade investors (F4, p. 18; F6, p. 56, C4, p. 55).

### **5.6.10 Develop a vision**

Entrepreneurs should know how to develop a vision relatively early and invest their time in formulating it precisely (F2, p. 23; C4, p. 16; C4, p. 41; U2, p. 22). At the same time, the vision should be easy for people to understand and visualize quickly (F6, p. 59). Finally, the entrepreneur should communicate the vision clearly and convincingly to the outside world (F1, p. 17; F11, p. 16; C1, p. 25; C3, p. 26; C6, p. 10). The vision should also be adaptable to constant change (U5, p. 45). To successfully sell the products and services, it is also essential to persuade the customers that the concept should be worthwhile and valuable (F8, p. 10; C5, p. 28). Employees should also be convinced and motivated to work for the start-up, even if they are not paid much initially (F9, p. 43; C4, p. 45).

## **5.7 Implications for entrepreneurship education**

In his review, Samwel Mwasalwiba (2010) reviewed 20 articles focusing on the definitions and objectives of entrepreneurship education. He found out that 32 % of the reviewed articles aimed at influencing *attitudes, behaviour, values* or *entrepreneurial intentions*. Moreover, he distilled four general objectives of entrepreneurship education: Start-up & job creation, contribution to society, stimulating entrepreneurial skills, and increasing entrepreneurial spirit, culture, and attitudes. It is a notable fact, however, that the main focus of the programs analyzed by Samwel Mwasalwiba (2010) was on the development of the entrepreneurial spirit, culture, and attitudes and not on the stimulation, development, and evaluation of practice-oriented entrepreneurial knowledge, skills, and attitudes (competences). The latest analysis of the most frequent topics in entrepreneurship education reveals that topics such as personal characteristics, entrepreneurial intentions (EI), and self-efficacy are especially prominent in entrepreneurship education (Wan and Lv, 2021).

## Define clear and realistic learning objectives

Entrepreneurship education (EE) aims to prepare students for future entrepreneurial activities (Bacigalupo et al., 2016; Lackeus, 2015). For that reason, educators define learning objectives, develop specific pedagogical interventions, and define evaluation and assessment strategies to measure the outcomes and effectiveness of their courses (see the Constructive Alignment by Biggs (1996, 2011)). Content, teaching methods, and format, as well as the evaluation strategy, depending on the target group, organizational, financial, and strategic goals and conditions of the local institutions, and the type of education provided (formal, non-formal, informal) (Gartner, 1985; La Belle, 1982). Moreover, the design of course content depends on the practical experience and theoretical knowledge of the lecturer (Sirelkhatim and Gangi, 2015; Hannon et al., 2006). In the EE literature, an established categorization can be found and is applied by many authors: teaching *about*, *for* and *through* entrepreneurship (Sirelkhatim and Gangi, 2015; Lackeus, 2015; Heinonen and Poikkijoki, 2006; Samwel Mwasalwiba, 2010). In his study Hills (1988) found out that according to the perceptions of leading entrepreneurship educators, the overriding educational objective is to increase student's awareness and understanding of the new venture initiation process. Different authors have updated the in-depth research on entrepreneurship programs and their objectives (Samwel Mwasalwiba, 2010; Lackeus, 2015; Sirelkhatim and Gangi, 2015; Wan and Lv, 2021). Referring to the third research question developed above:

RQ3: What are the implications for entrepreneurship education?

it is, therefore, critical to understand and define a) the local (organizational) ecosystem and b) the potential and realistic aims and objectives of educational interventions. Based on the insights of the empirical study and the body of knowledge in entrepreneurship education, it can be confirmed that the competences discussed in the literature are relevant for practice. Thus, it could be shown that a critical set of competencies is relevant for nascent entrepreneurs. However, the configuration and the set of competences are ambivalent. The study also identified new relevant competences and character traits not mentioned in the literature. Among others is the crucial role of team formation for successful venture projects. Therefore, further research on team formation and psychological and motivational factors to ensure and foster effective and harmonious team collaboration are needed to guide entrepreneurs and educators to include team formation strategies in their pedagogy, teaching content, and format. Next, communication and network building was identified as key activity and, therefore, critical competence of entrepreneurs. In traditional entrepreneurship curricula at universities, both competences maybe not be a dedicated part of entrepreneurship education. Thus, program designers and educators should raise awareness, include stakeholders, and provide networking activities in their programs. Target



group-oriented presentation of relevant problems and business solutions is an option for developing communicative competence. Other topics, such as negotiation, conflict solving, and intercultural communication, can also be implemented in the entrepreneurship curricula. The category system used in the study has proven to provide an appropriate, theory-led, and robust framework. The sub-categories developed through the entrepreneurial activities suggested by Byers et al. (2011) have proven to help categorize entrepreneurial competences. However, only view competences could be identified for the sub-category "Manage risks" and "Attract resources." The category "Execute on the vision" may be too broad, including many domain competences.

### **Include stakeholders from the local entrepreneurial ecosystem**

Successful entrepreneurship education requires highly interactive teaching and learning formats. As presented by Wan and Lv (2021), the identification, connection, and active collaboration between stakeholders within the university and the local entrepreneurial ecosystem are vital. The insights from the interviews and their transfer and application to design an entrepreneurship education setting reveal that teaching for and about entrepreneurship can not take place in a class only. Instead, a practice-oriented entrepreneurship education course includes stakeholders from the local entrepreneurial ecosystem. To provide social and personal competences, such as communication and networking, students must be exposed to potential customers, and users for idea and prototype validation to pitch their product ideas and business models to potential investors or company experts for network and financial support. Therefore, educators should act entrepreneurially by developing networks within and outside the university to include experts, mentors, guest speakers, and role models in their classes and inspire students with ideas, options, and possibilities. These measures will foster and support the team formation process of students in their future real-life projects outside educational settings.

### **Develop and foster entrepreneurial personalities**

Social and personal competences, as well as character traits, play a significant role for entrepreneurs. According to the interview partners, communication is one of the top competences vital for entrepreneurial actions. Therefore, entrepreneurs must be outgoing, sociable, action-oriented, enthusiastic, and friendly. Moreover, according to the European Commission, communication is considered one of the key competences for lifelong learning (Commission, 2019). In the context of entrepreneurship, communication is manifold and diverse. Entrepreneurs negotiate with partners, investors, co-founders, suppliers, and customers. They solve problems and conflicts, inspire, persuade and motivate team members,

and present their vision and business ideas to potential investors and stakeholders. In addition to key competences, character traits play a crucial role. A personality trait is defined as "a characteristic of an individual that exerts a pervasive influence on a broad range of trait-relevant responses" (Ajzen, 2005, p. 2). Numerous normative and descriptive studies have supported various sets of personality characteristics of entrepreneurs (Baum et al., 2014; Begley and Boyd, 1987; McClelland, 1973; Rauch and Frese, 2007). Some Big Five personality traits (especially openness to experience) have been associated with entrepreneurial performance (Zhao and Seibert, 2006). However, no difference was found in extraversion between entrepreneurs and managers.

### **Create learning experiences**

For the implementation of the pedagogical interventions and creating a profound learning experience, experiential learning Kolb (1984, 2014); Smith (2016) should be employed, which includes four cognitive, emotional, and operative stages (Experiential Learning Cycle): I) Expose participants to relevant entrepreneurial events and situations and create an experience through specific activities (Concrete experience), II) Observe, document and review the main insights and experience with students (Reflective observation), III) Concluding and learning from insights, events, outcomes and results (Abstract conceptualization), and IV) Develop experiments and create settings to implement and test what you have learned (Active experimentation). The authors identified several pedagogical methods to foster and support entrepreneurship education. Seikkula-Leino et al. (2015) found cooperative learning, problem-based learning, group and peer work, project work, learning by doing, pedagogical drama and learning diaries, organized excursions, field visits, and inviting visitors to the school as guest lecturers. Learning and teaching formats are interactive, and practice-oriented teaching-learning environments Esmi et al. (2015).

## **5.8 Conclusions and limitations of the study**

The study presents critical entrepreneurial competences and profiles based on semi-structured interviews with company experts, start-up consultants, entrepreneurship educators, and entrepreneurs. The qualitative text and content analysis have derived a list of entrepreneurial competences. The interview partners have highlighted the role of team formation, communication, problem-solving, and networking. In addition, nine personal characteristics were identified needed for entrepreneurial action. As a result, the most prominent entrepreneurial competences and educational framework conditions and tools are selected and proposed for efficient and practice-relevant entrepreneurship education.

The study contributes practical insights into the entrepreneurship education research field. Educators can align, synchronize, and confirm their established curricula. Educators and new entrepreneurship program designers get the point of reference, inspiration, and guidance in developing and introducing new course curricula and critical elements for implementing successful and practice-oriented entrepreneurship education and training. Referring to the literature review on entrepreneurial competences by Tittel and Terzidis (2020), the results of the underlying empirical study indicate a slightly different view on entrepreneurial competences. As identified in the literature and stressed by key authors in entrepreneurship (e.g. Shane and Venkataraman (2000); Dimov (2002); Hansen et al. (2011); Ardichvili et al. (2003)), one of the entrepreneurship-specific competences is "opportunity recognition". Indeed, through the qualitative text analysis, it was possible to identify specific information mentioned by the experts and categorize it into the "Opportunity" sub-category. Competences and processes such as market analysis, customer validation and idea generation inductively and deductively emerged from the text corpus. Opportunity recognition appears only slightly in the samples of educators, consultants, and company experts. A potential and very probable reason for this phenomenon is that experts and practitioners consult entrepreneurs in a stage where a business idea already exists. Thus, the experts focus on processes and competences related to later start-up stages, such as opportunity evaluation and exploitation. Entrepreneurs emphasized "Problem solving" and "Finding the right team" competence since all the entrepreneurs in the sample already have a business idea. "Generate ideas" is a solid indicator for opportunity recognition and the related processes needed to be accomplished by the entrepreneur and their team. Therefore, there is empirical support for opportunity recognition to be a vital competence for entrepreneurship and a valid reason why some experts did not explicitly mention opportunity recognition as a key entrepreneurial competence.

However, after identifying an opportunity, the entrepreneur needs to be motivated and needs to be willing to exploit the opportunity. In that context, the Entrepreneur-Opportunity Nexus is a critical framework that connects the entrepreneurial individual and the characteristics of a business opportunity. After the introduction of the concept by Shane and Venkataraman (2000); Shane (2003), the literature on entrepreneurial opportunities has grown rapidly. Recent studies have shown that an Entrepreneur-Opportunity Nexus is key for entrepreneurial motivation and the decision to start a venture company Yachin (2019); Bergner et al. (2021). Unfortunately, the interview material does not contain the terms "Entrepreneur-Opportunity Nexus" or other nexus-related comments. Despite the high relevance and significant importance for entrepreneurship theory and practice, it can be said that it is not the lack of theory or empirical research but the entrepreneurship support system.

Future research is needed to focus on entrepreneurial team formation, success factors for effective collaboration, and the role of visioning in the initialization of an entrepreneurial

venture. To provide a more detailed comparison between state of the art in the academic and educational field and practice, a large international study with entrepreneurship educators is needed to detect the main differences and gaps in education and training. Especially the specific conditions of entrepreneurial ecosystems should be considered and put into context when analyzing the educational offers of educators and the practical challenges of entrepreneurs in a particular region, market, and industry. Qualitative research represents interview partners' opinions, insights, and personal experiences, limiting the results' generalizability across regions, ecosystems, and cultures. In addition, an empirical and scientific-based operationalization of the Entrepreneur-Opportunity Nexus is needed to support nascent entrepreneurs in identifying the "right" opportunity for the entrepreneur and the entrepreneurial team. Moreover, a transfer of tools and methods to entrepreneurship support systems is needed to enable educators and consultants to guide future entrepreneurs in the opportunity recognition and evaluation processes.

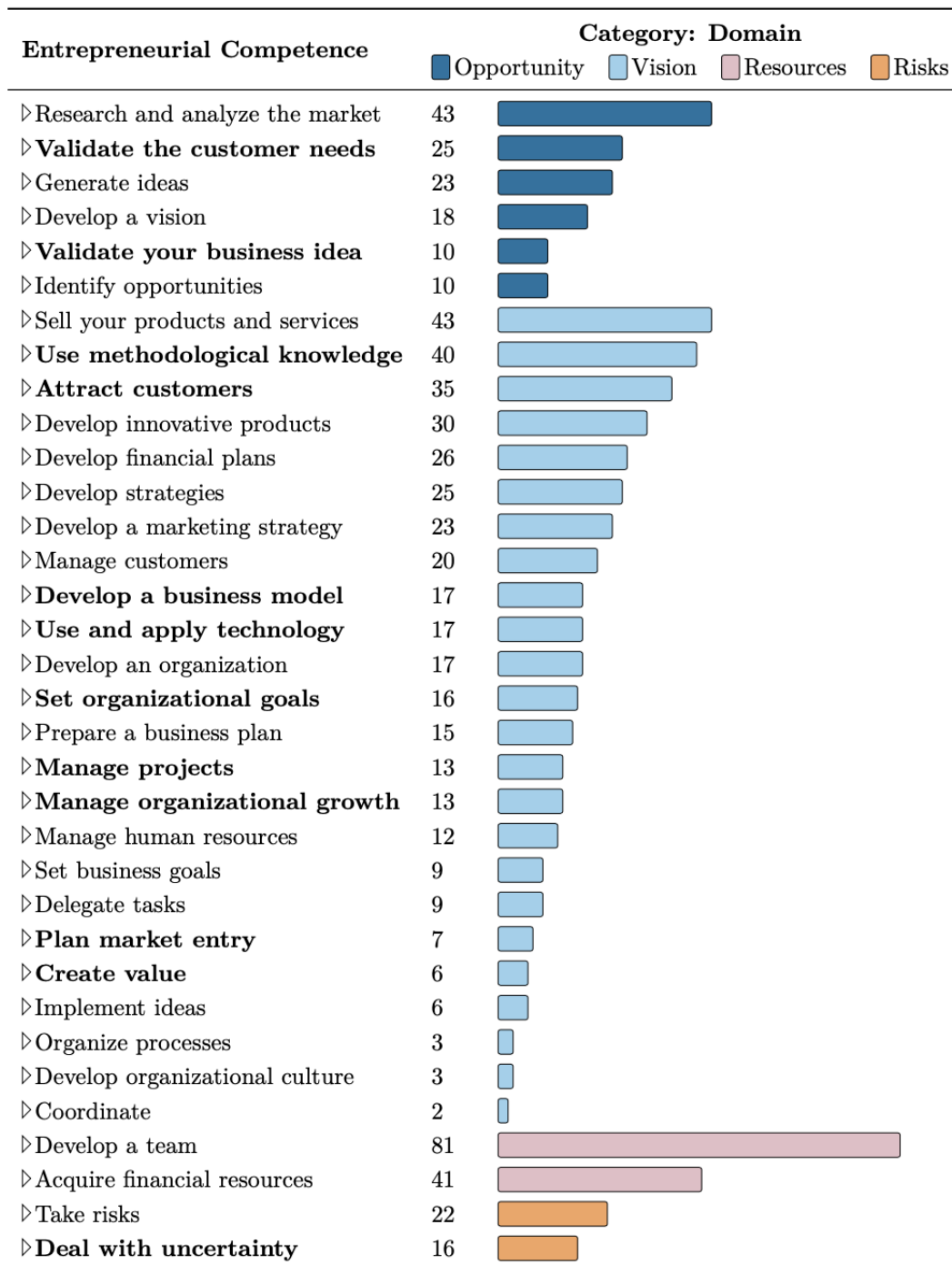


Figure 5.3: Entrepreneurial competences derived by the qualitative analysis (Domain competences)



Figure 5.4: Entrepreneurial competences derived by the qualitative analysis (Personal competences)

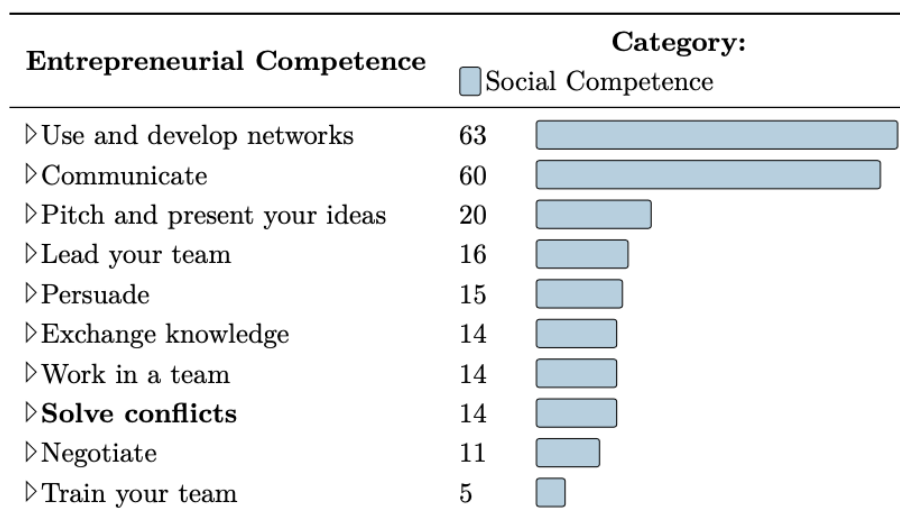


Figure 5.5: Entrepreneurial competences derived by the qualitative analysis (Social competences)

## Chapter 6

# Ikigai - An approach for modern entrepreneurship?

The following study is a logical extension of the previous work on the entrepreneurial competences identified by the systematic literature review and the qualitative expert study. The Entrepreneurial Competence Framework in section 4 categorizes entrepreneurial competences and presents a list of relevant competences discussed and identified in the entrepreneurship literature in the last decade. In this framework, one of the key domain competences is opportunity recognition. Based on the competence debate in the previous sections, the underlying chapter focuses on opportunity recognition as a distinctive competence for entrepreneurship. It aims to develop and test a pedagogical intervention for opportunity recognition in an entrepreneurship education course at the KIT. To achieve this goal, the first section evaluates modern entrepreneurship approaches, such as Design Thinking, Lean Startup, Business Model Canvas and Effectuation, to find out if they address and foster the Entrepreneur-Opportunity Nexus and holistically address and integrate personal (internal) and environmental (external) criteria. Further, this chapter evaluates Ikigai's usefulness in expanding entrepreneurship education towards an entrepreneur-centred view for a holistic approach to entrepreneurship and opportunity recognition specifically. The following bibliometric analysis and its results were submitted to the European Academy of Management (EURAM) in January 2023. Main parts of the first sections are a copy of the submitted text.<sup>1</sup>

In recent decades, entrepreneurship has gained increased attention as an academic field and a key tool for economic growth. Over time, practise-oriented and valuable tools, methods, and approaches have been developed to support entrepreneurs, entrepreneurial students and researchers in finding business needs and opportunities and developing sound value propositions (e.g., Design Thinking), creating an agile business development approach and

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<sup>1</sup>The co-authors are listed in the specific order: Alexander Tittel, Bettina Maisch, Barbara Wolf, Johanna Anzengruber, and Orestis Terzidis.

mindset in new venture creation (e.g., Lean Startup) as well creating a first business model for the new business organization (e.g., Business Model Generation). Entrepreneurship education and other entrepreneurship support programs outside the academic field play a crucial role in promoting entrepreneurship as a potential career path and developing entrepreneurial competences to prepare students for future venture creation.

A profound and recent compilation and analysis of standard tools, methods, and approaches in entrepreneurship support systems are hard to find. However, in their cross-sectional study, Küttim et al. (2014) analyzed the entrepreneurship education offerings in 17 European countries and found out that higher education institutions are offering three basic types of entrepreneurship support: I) Lectures and seminars about topics of entrepreneurship, II) Networking and coaching opportunities for students, and III) Resources for founders and entrepreneurs. The authors identify a significant gap between current university offers and students' demand for specific topics and offerings in their study. Among others, "Mentoring and coaching programs for entrepreneurs" have an essential contrast (see Küttim et al. (2014, fig. 3 and 4)). Therefore, the question arises as to what exactly is to be taught in entrepreneurship education and which mentoring and coaching programs for entrepreneurs and entrepreneurial students are relevant, valuable and worthwhile.

It is a notable fact that the tools and methods presented above support entrepreneurs in developing a viable business venture by defining the problem and the solution space. However, current students and future entrepreneurs are Generation Y and Generation Z and have special characteristics and unique requirements for their future careers. They expect their future work to be meaningful, exciting and purposeful and resonate with the organization's values, objectives, ethics, practices and the social impact that the organization creates (Chillakuri, 2020). For that, reflection on personal values, means and ethics is required. Self-reflection, awareness and discovery, however, are crucial but not addressed in the processes and the current entrepreneurship tools and are accordingly underrepresented in the support offers. Consequently, there is little evidence of systematic teaching, mentoring or coaching approaches to integrate self-assessment into entrepreneurship education and support.

Currently, Ikigai (生き甲斐), a traditional Japanese concept for "life worth living", attracts international scholarly attention and is being used in entrepreneurship education to find balance and harmony between what you love, what you are good at, what the world needs and what you can be paid for. However, as stated by Kotera et al. (2021, p. 2), "(...) much of the existing literature on Ikigai has relied on anecdotal episodes, without a clear focus on scientific or clinical literature." Against this background, the chapter formulates four contributions: I) It presents critical tools and methods used in entrepreneurship and entrepreneurship education and provides a brief analysis of their applicability to support the entrepreneurial individual in self-realization and self-assessment.



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II) Based on a bibliometric literature analysis and review of relevant publications, it provides a profound insight into the Ikigai framework and reveals its potential for application in entrepreneurship education and support programs. III) It presents and discusses implications for modern entrepreneurship and suggests a triple-diamond model for entrepreneurship theory and practice, including a highly relevant but underrepresented dimension: The Entrepreneur Space. IV) Finally, it compiles critical entrepreneurial topics associated with the Ikigai framework and provides recommendations and inspiration for future research. Hence, the study addresses the following research question (RQ) and the respective sub-questions (SQ).

- RQ 1: To what extent can Ikigai play a remarkable role in the founder-centred approach to entrepreneurship?
- SQ 1.1 How well do established entrepreneurship tools and methods consider the founder's perspective and help to find the Entrepreneur-Opportunity Nexus?
- SQ 1.2: What do we learn about the Ikigai approach when analysed from an academic research community perspective?
- SQ 1.3: Which association between Ikigai and Entrepreneurship can be found in the literature?

Based on that, the Ikigai framework will be operationalized, applied and iteratively tested in the following sections using instructional design as well as qualitative and quantitative methods. The study's relevance and implications for theory and practice can be anchored in the Individual-Opportunity Nexus Theory by Shane (2003). The Individual-Opportunity Nexus Theory describes that a close connection between an entrepreneurial-thinking person and an entrepreneurial opportunity is required to create entrepreneurial ventures. Eckhardt and Shane (2010, p. 49) define entrepreneurial opportunities as "situations in which new goods, services, raw materials, markets, and organizing methods can be introduced for profit." An opportunity is often associated with the entrepreneurs and their actions (Dimov, 2011). As pointed out by Kirzner (1973) in his creation theory, opportunities are created by entrepreneurial individuals. Also, Sarasvathy et al. (2003, p. 143) argues that "the opportunity has no meaning unless the actor/s actually act upon the real world within which the opportunity eventually has to take shape." But what makes a business opportunity attractive to entrepreneurs who are willing and motivated to exploit it? Entrepreneurship theories often focus either on the entrepreneurial individual taking a psychological or cognitive perspective (see Begley and Boyd (1987); Forbes (1999); McClelland (1967)) or analyze and structure the external environment (see Arrow and Debreu (1954); Baumol (1993); Kirzner (1973)). Therefore, the entrepreneurial individual (entrepreneur space)

and the external environment in which they operate are critical elements to be considered and discussed in the following sections by analyzing current tools and methods used in entrepreneurship. The particular focus of the analysis is whether the respective tools address the entrepreneur space or focus on exploring the external environment, including the new venture formation and the business model generation.

## 6.1 Contemporary tools and methods in entrepreneurship

### 6.1.1 Design Thinking

In the last decades, the method "Design Thinking" has gained increased attention in the academic (e.g., engineering and entrepreneurship education) and the business (e.g., innovation projects in entrepreneurial and established companies) fields. Design Thinking is an iterative and human-centred process that aims to develop and design innovative solutions for a specific target group. It identifies the main challenges and focuses on the needs and problems of potential users and customers. The following quote by Brown and Katz (2011) highlights the user-centricity of the Design Thinking approach:

*A better starting point is to go out into the world and observe the actual experiences of commuters, skateboarders, and registered nurses as they improvise their way through their daily lives (p. 382).*

The application of Design Thinking in academic and practical contexts resulted in various process models (see Waidelich et al. (2018)). For instance, the authors Brown et al. (2008) and Chou (2018) present Design Thinking as a three-step approach using the inspiration, ideation and implementation phases. A seven-step Design Thinking process is suggested by Ambrose and Harris (2009): Define, Research, Ideate, Prototype, Select, Implement, and Learn. All these processes follow the diverge-converge sequence of the Double Diamond, developed by the UK Design Council (2023). Figure 1 presents the integration of the Design Thinking framework by HPI (2023) with a 6 step approach. The steps can be categorized in the problem space (understand, observe, define) and the solution space (ideate, prototype, and test). Each space has a diverging and a converging phase. Design Thinking aims to deepen the understanding of the people involved first by collecting information from various resources (diverge 1: Understand and Observe). Then, the stakeholder group's specific needs must be identified and addressed (converge 1: define). The second diamond will generate and prototype various possible ideas for solutions (diverge 2: Ideate and Prototype). Through continuous testing and iteration, the best possible solution will be selected and implemented (converge 2: Test).

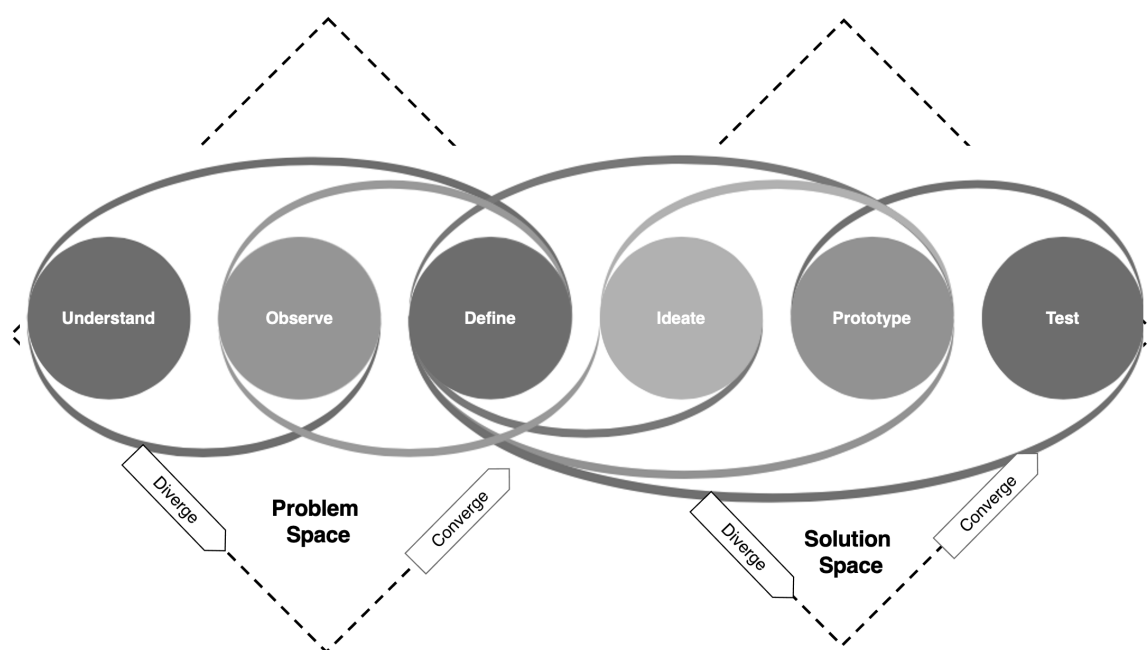


Figure 6.1: Design Thinking Process. Inspired by HPI (2023) and the Double Diamond by the UK Design Council (2023).

Notably, the Design Thinking approach focuses on the target customers or potential users and develops strategies to emphasize with them to get a profound understanding of the underlying problem and develop user-specific (business) solutions. Thus, Design Thinking provides an appropriate, useful and established framework for entrepreneurs to develop and design customer-oriented products or services.

However, Design Thinking does not consider the personal characteristics of the founder or the entrepreneurial team, such as the needs, motives, capabilities, resources, and personal values. Therefore, the question arises to what extent does the identified problem fit the founders and foster their motivation to pursue the potential business solution?

### 6.1.2 Lean Startup

Based on his previous challenging experiences in creating a viable venture company, Ries (2011) combined methods from other disciplines, such as engineering and production, to present an agile approach to entrepreneurship by creating product prototypes and ideas (build), testing them on the target markets (measure), and evaluating the results to improve the prototype (learn) iteratively. Following Toyota’s lean manufacturing production method, Ries (2011) presented the Lean Startup approach, which gained popularity in the entrepreneurship domain. As a core, the Lean Startup approach is built on the build-measure-learn circle presented. Unlike Design Thinking, Lean Startup addresses the solution space

and has no planned diverging or converging stages. Instead, it presents an iterative character through cycles of build-measure-learn phases. Ries (2011) defines a startup as

*(...) "a human institution designed to create a new product or service under conditions of extreme uncertainty" (p. 27).*

The definition of a startup highlights the challenging social and economic environment the entrepreneur needs to cope with. Extreme uncertainty, volatile market conditions and legal frameworks are critical challenges for entrepreneurs, their motivation, perseverance, and mental health. Nevertheless, analytical or creative processes addressed to establish a strong vision and a solid ground for the personal inspiration, purpose and reason of the entrepreneurial activities are missing in the Lean Startup approach.

### **6.1.3 Business Model Generation / Canvas**

One method that gained popularity over the past ten years is the Business Model Canvas (BMC) proposed by Osterwalder and Pigneur (2010). The Business Model Canvas includes nine components: customer value proposition, segments, customer relationships, channels, key resources, key activities, partners, costs and revenues. The core of the Business Model Canvas resides in exploring a) how these key components create value for customers, b) how activities and resources are organised within the organisation and throughout its supply chain and partners, and c) how the company generates value (Osterwalder and Pigneur, 2010). This definition highlights three main aspects of the Business Model Canvas: value creation, configuration, and capture. However, it becomes evident that the Business Model Canvas is an instrument that focuses on the value creation and delivery and does not include the perspective on entrepreneurs, their mindset and self-realization tendencies.

### **6.1.4 Effectuation**

Effectuation is an approach frequently used by entrepreneurs to develop new business opportunities (Prijadi et al., 2022). This method uses entrepreneurial techniques and principles to face future uncertainties, including experimentation, affordable loss, partnerships with pre-commitments, and flexibility (Sarasvathy and Dew, 2008). According to Sarasvathy (2001, p. 245), it refers to a "process that takes a set of means as given and focuses on selecting between possible effects that can be created with that set of means." As a core, effectuation is built on five sequential steps, which are conducted iteratively by using the entrepreneur's power as well as crowds and communities (Sarasvathy, 2001, 2004). In the first step, called the "Bird in Hand Principle", entrepreneurs imagine various possibilities. In this phase, they focus on the questions "who I am", "what I know", "whom I know",

and "what are my means". Limiting risks of the venture is at the centre of the second step ("Affordable Loss Principle"). The effectuation process is presented in fig. 6.2.

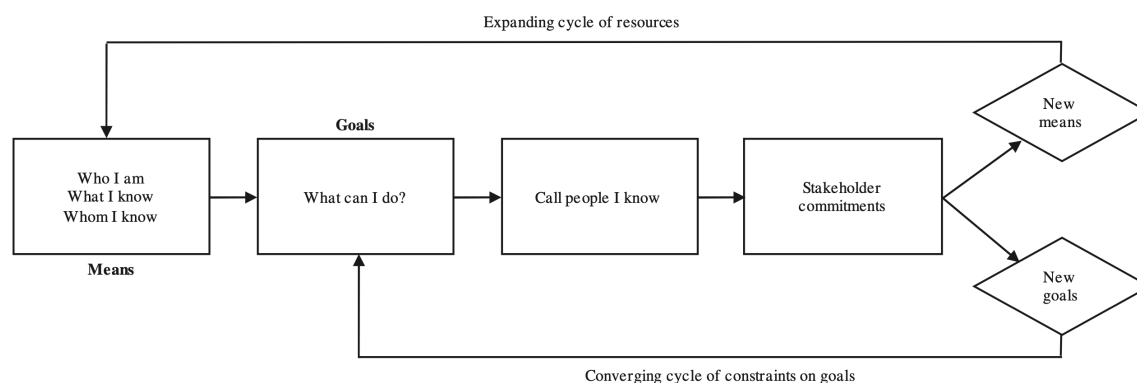


Figure 6.2: Effectuation process by Sarasvathy and Dew (2005).

Leveraging contingencies and embracing surprises that arise from uncertain situations ("Lemonade Principle") while at the same time remaining flexible rather than tethered to existing goals is critical in the third step. In the fourth step, the entrepreneurs aim to form viable and long-lasting partnerships that help them jointly create the future ("Crazy Quilt Principle"). In the final step, entrepreneurs design the future based on what can be controlled (Sarasvathy and Dew, 2005), as this increases the chances of bringing desired results ("Pilot in the plane Principle"). Although effectuation includes the capabilities and belief systems of entrepreneurs, positive emotions, purpose and well-being of the entrepreneur are not at the core of the effectuation theory. However, the effectuation theory provides valuable and critical guiding questions that reflect the entrepreneurs' inner dimensions.

Based on the theory of the Entrepreneur-Opportunity Nexus presented above, table 6.1 presents the commonly used frameworks in entrepreneurship and entrepreneurship education and their dedicated focus on the entrepreneur or the external environment (opportunity). It can be concluded that most of the standard tools and methods do not provide guidance to help entrepreneurial individuals find their inner purpose and meaning in life as a critical motivational factor for entrepreneurial performance, persistence and resilience. None of the frameworks provides guidance or techniques to find a solid interconnection between the entrepreneur's characteristics (e.g., personal values, competences, interests, talents, attitudes and character traits) and the features of the new venture project (e.g., target customers, markets, product characteristics, social or environmental impact etc.).

Framework	Entrepreneur	Opportunity	Nexus
Design Thinking	✘	✓	✘
Lean Startup	✘	✓	✘
Business Model Canvas	✘	✓	✘
Effectuation	✓	(✘)	(✘)

Table 6.1: Results of the entrepreneurial tools and frameworks analysis

A common starting point of an entrepreneurial journey in entrepreneurship classes and an actual venture project is defining a business idea or identifying a business opportunity. This fact is supported by Heinonen and Poikkijoki (2006, p. 86) with the following statement:

*"In the university setting, the triggering event in most cases is an external opportunity of a certain kind, coming top down from teacher to student."*

Empirical evidence shows that a desirable and feasible business idea positively affects entrepreneurial intentions (Shapiro and Sokol, 1982; Ajzen, 1991; Yachin, 2019). However, to develop a desirable, feasible and viable business idea, the entrepreneur needs to find his Entrepreneur-Opportunity Nexus (Shane, 2003). In entrepreneurship classes, it can be observed that an inspiring and desirable business idea increases students' motivation to realize the business idea, teamwork performance and the effort to work on their venture projects. Thus, it positively affects the pedagogical results and the overall learning experience.

The initial assumption which guides the following study is that the Ikigai components, which include what you love, what you are good at, what the world needs, and what you can be paid for, can affect the perceived desirability of a business idea by providing a framework for evaluating the potential success (external view) and fulfilment (internal) of the idea and thus, strengthen the Entrepreneur-Opportunity Nexus. If a business idea aligns with all of these components, it may be seen as highly desirable as it incorporates elements of passion, competences, and financial viability. Conversely, if a business idea does not align with these components, it may be seen as less desirable. Unfortunately, in theory, and practice, an established, evidence-based and practice-oriented framework to I) identify business opportunities and II) find the individual Entrepreneur-Opportunity Nexus in entrepreneurship education is hard to find.

## 6.2 Methodology

The bibliometric citation analysis (Donthu et al., 2021) is used to analyze state of the art and the relative impact of theoretical frameworks, authors, or institutions. Thus, it represents an analysis method of research structure and tendencies in a body of literature

(Muhuri et al., 2019). The analysis of relevant literature uses many different components of a bibliometric record. The most common components of the analysis are authors, author affiliation, keywords, year of publication, and source (e.g., journal) in which the document is published. In addition, the bibliometric citation analysis helps to visualize and analyze the linkages between and among authors and articles in the relevant literature using analytical visualization software. Next, the identified literature is reviewed to present and discuss current developments and ideas in empirical studies with regard to Ikigai and its intersection with entrepreneurship.

### Data Collection Strategy

To identify relevant articles and enter the field of research, the data collection strategy presented in table 6.2 was applied. Scopus and Web of Science provide an interdisciplinary database for peer-reviewed journals. In addition to that, Google Scholar was used for a complimentary search for scientific and non-scientific sources. Since Google Scholar also accesses both databases, the results were not included in the primary database. Instead, relevant sources were collected and analyzed separately.

		<b>Search Results</b>
<b>Search Key 1:</b>	Ikigai	
Database 1:	Scopus	46
Database 2:	Web of Science	76
Web Search Engine:	Google Scholar	15
Search within:	Title OR Keywords	
Publication Date:	1994- 2021	
Document Type:	All	
<b>Number of publications after reduction of duplicates</b>		<b>99</b>
<b>Search key 2:</b>	Ikigai AND entrepreneur*	
Database 1:	Scopus	0
Database 2:	Web of Science	0
Web Search Engine:	Google Scholar	525
Search within:	All fields	
Publication Date:	1994- 2021	
<b>Number of relevant publications</b>		<b>6</b>

Table 6.2: Data collection strategy

## Data Analysis

As a result, 46 documents in Scopus and 76 documents in Web of Science (WOS) were identified and collected. Unfortunately, the databases use different coding and can not be merged easily for further analysis, duplicate reduction, and visualization of results. First insights reveal that there are disparities between WOS and Scopus samples. To merge the data sets into one database, the guidelines by Echchakoui (2020) were applied using R. First, both data sets were converted into the same format using R's `convert2df()` function. Second, both data sets are merged, and 23 duplicates removed (`Combined_data <-mergeDbSources(WOS_data,Scopus_data, remove.duplicated = T)`). After reducing duplicates in the combined data table, 99 original articles remained. Specific exclusion criteria were not applied since it is interesting which topics and research fields are covered and addressed regarding Ikigai. Google Scholar became a powerful and easy-to-use search engine for authors looking for scientific publications in recent years. However, the search engine has significant limitations for performing a profound bibliometric analysis (Aguillo, 2012) and therefore was not used as the third source for data collection.

Nevertheless, a search for the keyword "Ikigai" in Google Scholar results in 5.110 hits and uncovers some relevant scientific but mostly non-scientific types of publications. The search results were screened manually, and relevant results were collected and analyzed separately. Based on a merged database from Scopus and WOS, an in-depth bibliometric analysis was performed to get a profound understanding of the research field. The analysis was performed through the R-package Bibliometrix (Aria and Cuccurullo, 2017). The following data types were analyzed:

- Research growth
- Most relevant sources
- Community and number of active authors
- Type of documents
- Most influential journals
- Most (local and global) cited documents
- Relevant Topics (Thematic map)

In addition to that, a second search was conducted using the search string: `Ikigai AND entrepreneur*`. As a result, no publications were identified in Scopus and WOS databases. Google Scholar showed 525 results. However, manual screening of the search results revealed only six relevant publications related to Ikigai and entrepreneurship. The results are presented in section 6.3.3.



### 6.3 Results of the bibliometric analysis

Figure 6.3 illustrates the tendency of publications. The scholar's interest in Ikigai as a research topic rapidly increased in 2018 from 4 to 16 publications in 2020. However, the few publications also show that Ikigai is still a niche topic. A search using the keyword "Entrepreneurship" results in 11.510 articles in the WOS database and 5.058 in Scopus. Table 6.3 presents general information about the numbers of authors, documents, and collaboration. It shows a rather small research community with 271 authors.

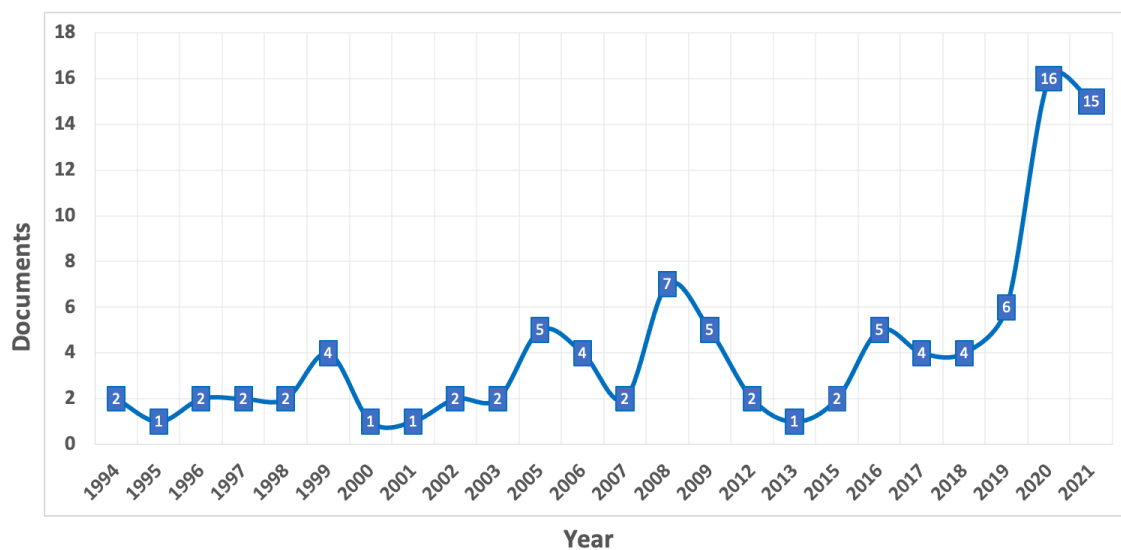


Figure 6.3: Annual Scientific Production: Ikigai from 1994-2021

The majority of the publications are research articles (fig. 6.4) published in medical and health contexts. In total, 20 journals were identified. The top ten journals are presented in table 6.4). To get an insight into and an impression of the topics and the research fields related to Ikigai, the 14 most cited authors and the title of their work are presented in table 6.5. The titles cover topics and themes such as the purpose of life, mortality, physical and psychological well-being, sense of life, and other medical subjects and topics. The Local Citations (LC) caption indicates how often an author (or a document) included in this database has been cited by the documents included in the collection. On the other hand, the Global Citations index (GC) indicates how many times an author (or a document) included in this database has been cited by the documents not included in the collection. As a key reference paper, the Ohsaki Study by Sone et al. (2008) is identified.

A thematic map was generated to confirm the initial impression gained from the thematic focus of the publications (see fig. 6.6. A thematic map creates a two-dimensional map (Degree of relevance/ Area of interest on the X-axis and Degree of development on the Y-axis) based on co-word network analysis and clustering. It uses a co-occurrence keyword

Authors	271
Author Appearances	400
Authors of single-authored documents	14
Authors of multi-authored documents	257
AUTHORS COLLABORATION:	
Single-authored documents	19
Documents per Author	0.365
Authors per Document	2.74
Co-Authors per Documents	4.04
Collaboration Index	3.21

Table 6.3: Number of the authors and documents in the research field

network to plot the typological themes in a two-dimensional map. Based on the thematic map, two types of information analysis can be considered: On the one hand, the analysis of the thematic structure of the database itself and, on the other hand, the observation of the research field. The thematic map in fig. 6.6 is divided into four sections: Niche Themes, emerging or declining themes, basic themes, and motor themes. Concerning the keyword analysis, the following motor themes can be observed: "Anxiety," "Mental stress," "Adult," "Diseases," "Students," as well as "Human ."They are characterized by both high centrality and density. As both centrality and density are high, it can be assumed that the topics are more developed in the literature. The upper-left quadrant (Niche Themes) shows high-density themes. Due to the low centrality, the topics are of limited importance for researchers in the field. In the lower-left quadrant are the emerging or declining themes. In this research, medical themes relevant to health issues can be found. Finally, the lower-right quadrant shows the themes that are basic and transversal. These themes are highly relevant to the research field. However, little research has been done on these topics due to the low density. In this area, the appearing themes are "Mortality," "life," "Japan," "Well-(being)," "Happiness," "Quality of life," "All-cause mortality," and "Incident disability."

From the insights of the bibliometric analysis, it can be concluded that the research field where Ikigai is used most is highly human-centred, medical, and focuses on health care and clinical research.

Author	Title	LC	GC
Sone et al. (2008)	Sense of life worth living (Ikigai) and mortality in Japan: Ohsaki Study	15	79
Koizumi et al. (2008)	Effect of having a sense of purpose in life on the risk of death from cardiovascular diseases	10	44

*Continued on next page*

Table 6.5 – *continued from previous page*

<b>Author</b>	<b>Title</b>	<b>LC</b>	<b>GC</b>
Tanno et al. (2009)	Associations of Ikigai as a positive psychological factor with all-cause mortality and cause-specific mortality among middle-aged and elderly Japanese people: Findings from the Japan Collaborative Cohort Study	10	45
Nakanishi (1999)	"Ikigai" in older Japanese people.	9	17
Shirai et al. (2006)	Factors associated with "Ikigai" among members of a public temporary employment agency for seniors (Silver Human Resources Centre) in Japan; gender differences	8	20
Nakanishi et al. (2003)	Changes in psychosocial conditions and eventual mortality in community-residing elderly people	7	17
Yamamoto-Mitani and Wallhagen (2002)	Pursuit of Psychological Well-Being (Ikigai) and the Evolution of Self-Understanding in the Context of Caregiving in Japan	6	26
Mori et al. (2017)	Sense of life worth living (Ikigai) and incident functional disability in elderly Japanese: The Tsurugaya Project	6	13
Wakai et al. (2007)	Psychological attitudes and risk of breast cancer in Japan: a prospective study	5	23
Nakanishi et al. (1995)	The Association of Health Management with the Health of Elderly People	4	15
Nakanishi et al. (2005)	Relationship between self-assessed masticatory disability and 9-year mortality in a cohort of community-residing elderly people	4	56
Kumano (2018)	On the Concept of Well-Being in Japan: Feeling Shiawase as Hedonic Well-Being and Feeling "Ikigai" as Eudaimonic Well-Being	4	9
Kono et al. (2019)	Theorizing Leisure's Roles in the Pursuit of "Ikigai" (Life Worthiness): A Mixed-Methods Approach	4	10

Table 6.5: Top most cited authors

Authors investigate mental and physical well-being factors, primarily in Japan, and publish their research in medical articles. Topics such as "Quality of life" and psychological

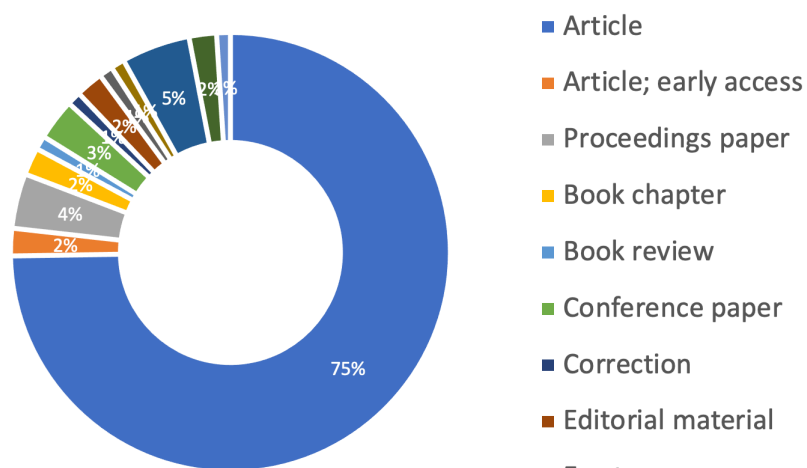


Figure 6.4: Types of documents produced from 1994-2021

Nr.	Journal	Articles
1	Journal of Psychosomatic Research	4
2	Age and Ageing	3
3	Applied Research in Quality of Life	3
4	Archives of Gerontology and Geriatrics	3
5	Colloids and Surfaces A-Physicochemical and Engineering Aspects	3
6	International Journal of Environmental Research and Public Health	3
7	Journal of Epidemiology	3
8	Culture Medicine and Psychiatry	2
9	Journal of The American Geriatrics Society	2
10	Psychosomatic Medicine	2

Table 6.4: Top 10 most relevant Journals

aspects such as "Mental stress," "Depression," "Motivation," but also "Age", and "Elderly people" play a significant role in that field. The thematic character of these topics could also be confirmed by analyzing the most frequent words and creating a word cloud. In addition, Google Scholar suggests related search and critical terms for Ikigai and indicates the following keywords: a sense of purpose, a life worth living, longevity, and Okinawa.

Figure 6.5 shows publishing countries and their active collaboration with other countries. According to the bibliometric data, authors from Japan, Canada, the USA, and the UK share an interest in collaborating and conducting research on Ikigai. Therefore, it is crucial to review state of the art and distil the main effects of Ikigai on people's mental and physical well-being.

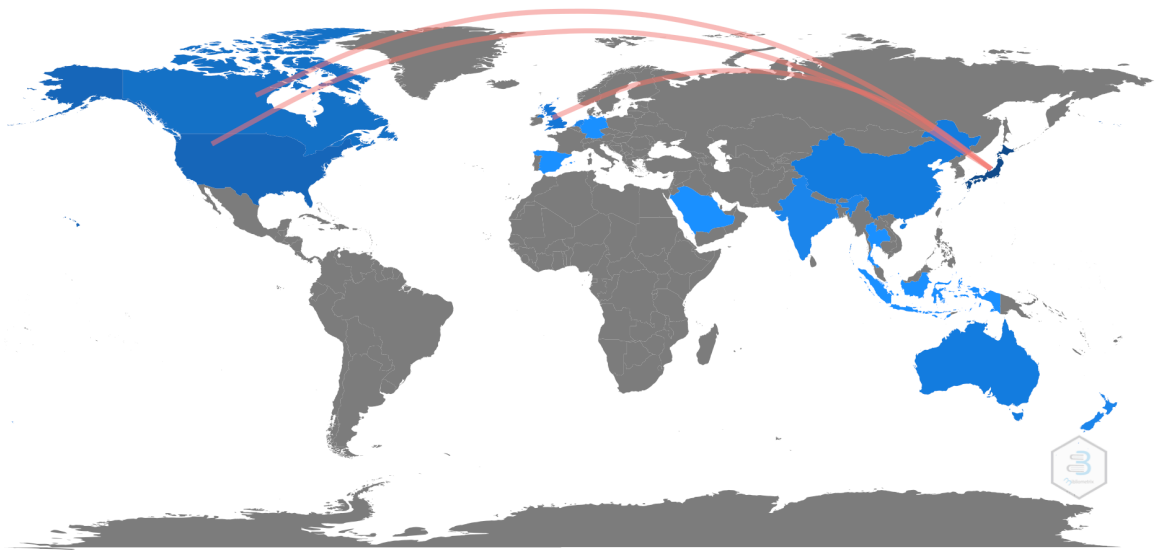


Figure 6.5: Authors' collaboration map

### 6.3.1 The meaning of Ikigai

A profound reflection on Ikigai can be found in Mathews (1996). Ikigai is a Japanese word, and according to the author, most dictionaries describe it in terms such as "something to live for," "the joy and goal of living", or even as "self-realization" (Kobayashi, 1989). In his research stay in Japan in 1989, Mathews (1996) observed considerable interest in Ikigai, indicated by over 50 newspaper articles in 18 months. He derived two main reasons: First, the rising age of the population in Japan, and second, the intense work of the people (for a company) and focus on productivity throughout life to pursue prosperity (affluence). Thus, it confirms the relevant topics identified by the thematic map (6.6). Interestingly, the author reports on a social dispute in Japan on the Ikigai concept. Some people consider Ikigai as a personal *role* within the society, whereas others consider Ikigai as *self-realization*. To better understand the role and meaning of Ikigai in the Japanese culture and people's perceptions of it, original interview and text extracts from Mathews (1996, p. 729) are presented below:

*A bank employee in his forties said, "My Ikigai is my work.... I can't separate myself from the bank - I am what I am because of it, it is what it is because of me." A mother in her late thirties said, "Since I got married, my family has been my Ikigai. Being for my family is being for myself and being for myself is being for my family." A few of these people expressed no doubt throughout our interviews about their Ikigai, their merger of self and role, but others expressed hesitation. As the woman cited above told me, after asserting that her family was her Ikigai, "I guess I sound like a very average person.... I've got to grow as an individual!" As a sarariiman in his forties said to me of his coworkers,*

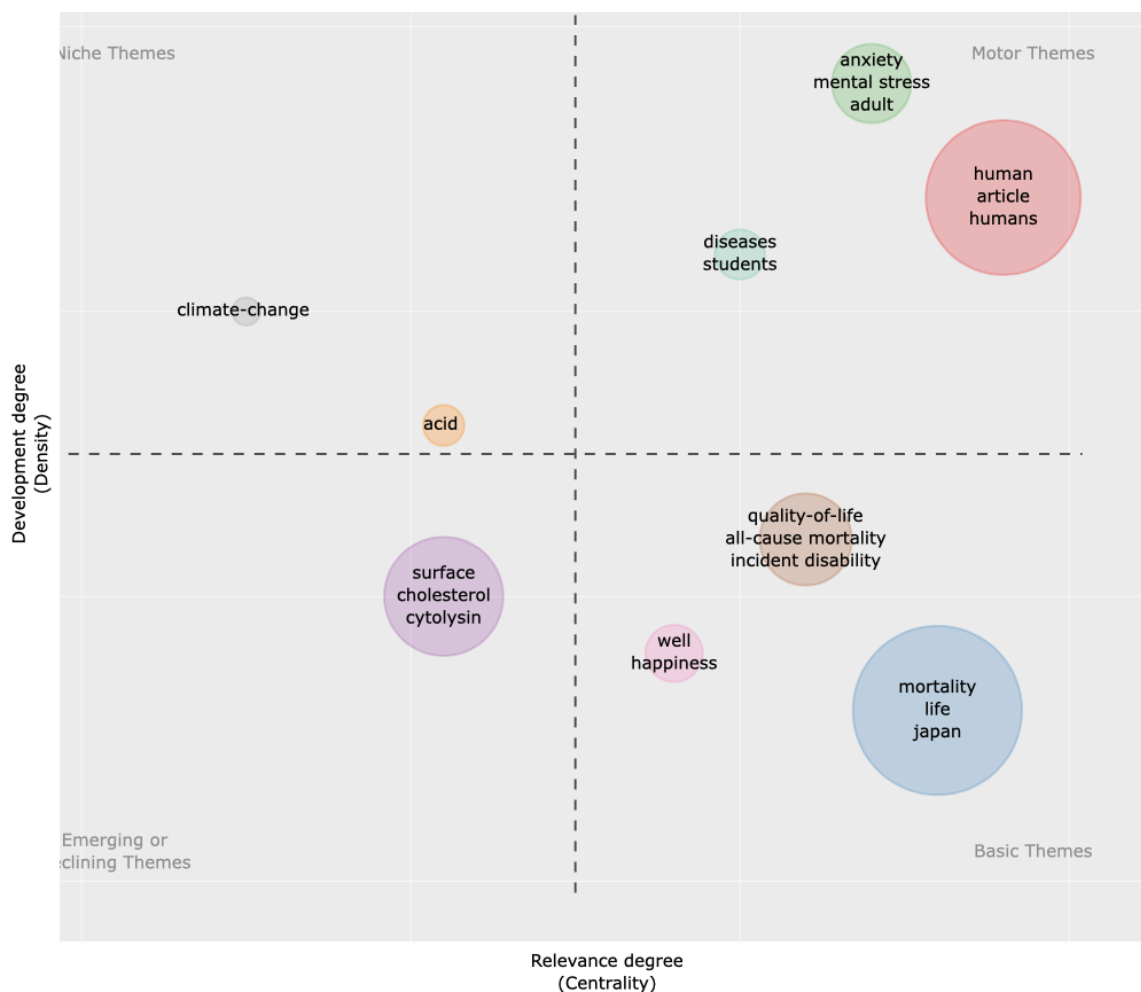


Figure 6.6: Thematic map

*"If you ask them, they may say that their work in the company is their Ikigai, but they just say that because they have nothing else to say.... Maybe I'm like that too." A delivery truck driver in his twenties said, "People working at [big companies] are just cogs. They don't have selves.*

The concept of Ikigai includes four guiding questions organized and presented in a Venn diagram (see fig. 6.7). The combination and intersection of all four key aspects lead to "that which most makes one's life seem worth living" (Mathews, 1996, p. 718). Thus, for everyone, Ikigai might be different and is very individual. According to the Ikigai framework, it is essential to find answers to the questions and balance and harmony between what you love, what you are good at, what you can be paid for, and what the world needs.

Interestingly, in the western culture, similar concepts to Ikigai and related research can be found (see, e.g., Don Gottfredson and Duffy (2008); Holland (1997); Schippers and Ziegler (2019)). Positive psychology, an established branch of psychology, is the scientific study of what makes life worth living, focusing on individual and societal well-being. Main



Figure 6.7: Ikigai Framework. Inspired by Myers (2018)

contributions were made by Seligman (2008, 2012) and were applied in research and practice (e.g., coaching). Positive psychology focuses on empirical research of human resources, strengths, potentials, and well-being. The fields of research are far-reaching. They include the effects of positive emotions on the psyche and physique through flow experiences, supportive social relationships and motivation, mindfulness, passion, and the experience of meaning (Brohm-Badry and Berend, 2017). In his PERMA Model, Seligman (2012, pp. 16) established five core elements of well-being:

1. Positive emotions
2. Engagement
3. (Social) Relationships
4. Meaning
5. Accomplishment

### 6.3.2 The effects of Ikigai on subjective well-being

As presented above, research studies indicate a positive effect of the sense of Ikigai on subjective well-being and happiness. In his book, Veenhoven (2013, p. 16) compiles various

definitions of happiness from literature and defines it as "the degree to which an individual judges the overall quality of his life-as-a-whole favourably" (p. 22). Similarly, well-being is defined as "people's positive evaluations of their lives, includes positive emotion, engagement, satisfaction, and meaning" (Diener and Seligman, 2004, p. 1). Based on that, Seligman (2002) uses happiness and well-being interchangeably.

As the main point of scientific reference, the Ohsaki study by Sone et al. (2008) is reviewed and presented below. Key parts of the following review are direct or indirect paraphrases of the original text. An original quote by Sone et al. (2008, p. 709) is presented below to introduce the meaning of the Ikigai:

"In Japanese culture, having a sense of "life worth living (Ikigai)" is the most commonly used indicator of subjective well-being. The sense of "life worth living (Ikigai)" does not merely reflect an individual's psychological factors (well-being, hopes) but also an individual's consciousness of the motivation for living, because it has a meaning akin to having a "purpose in life" and "reason for living." The term Ikigai is commonly used in such phrases as "this hobby is what makes my life worth living (Ikigai)" or "raising children makes my life worth living (Ikigai)".

Earlier medical studies have been conducted to investigate the association between Ikigai and the risk of all-cause mortality (Seki, 2001). However, as a cohort study with 43,391 participants, the Ohsaki study presents the most significant number of participants, the largest decedents, and the most comprehensive set of covariates for multivariate adjustment. In that study, the researchers investigated the relationship between the sense of "life worth living (Ikigai)" and the cause-specific mortality risk of the adult population in Japan in seven years starting in October 1994. The study design is based on a self-administered questionnaire distributed to participants aged 40 to 79 years and living in the catchment areas of the Ohsaki Public Health Center. The 93-item questionnaire consisted of questions related to the following ten factors: past medical history, family history, physical health status, drinking habit, smoking habit, dietary habit, job, marital status, education, and other health-related factors, including Ikigai. Ikigai was assessed through the subject's response to the question, "Do you have Ikigai in your life?" The subjects were asked to choose one of three answers: "yes," "uncertain," or "no."

As a result, the study reveals that those who did not find a sense of Ikigai were associated with an increased risk of all-cause mortality (see fig. 6.8). Interestingly, as the external cause of death, suicide was the most commonly encountered cause. Compared with people who found a sense of Ikigai, those who did not were more likely to be unmarried, unemployed, and had a lower educational level. Moreover, they had bad or poor self-rated health, a high level of perceived mental stress, severe or moderate bodily pain, and limitation of physical



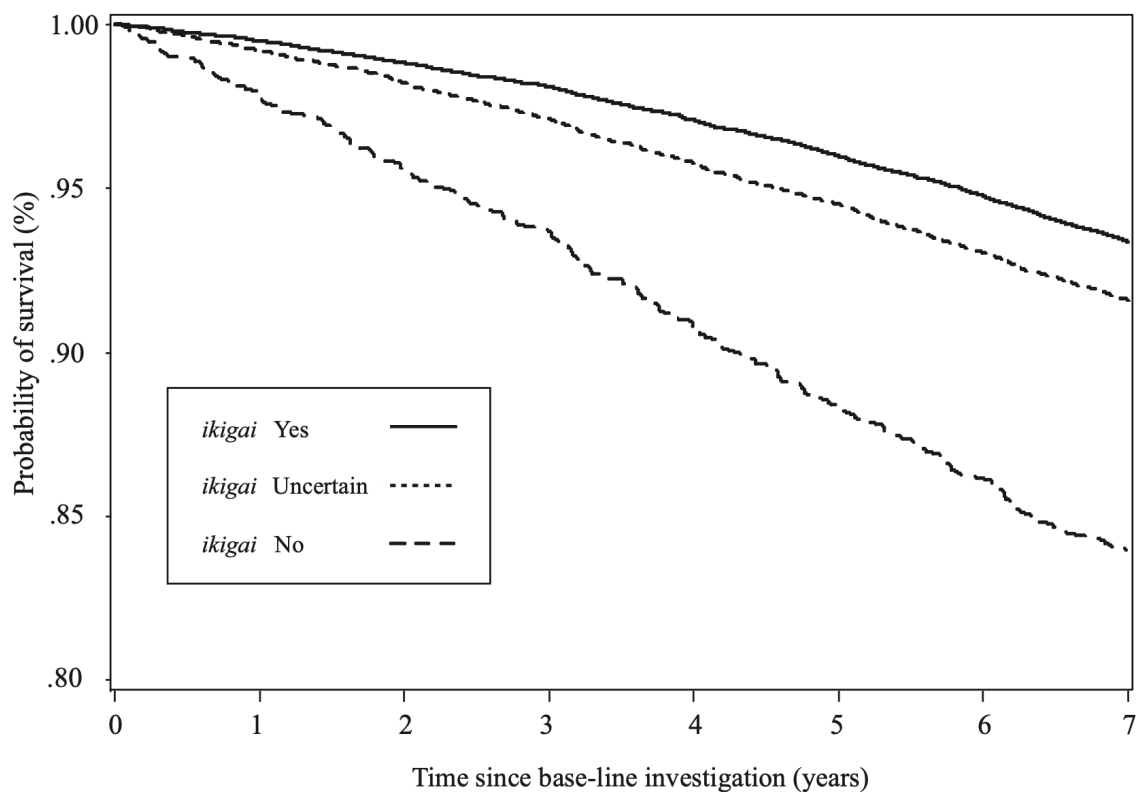


Figure 6.8: Kaplan-Meier curves of all-cause mortality according to Ikigai (n = 43,391). Source: (Sone et al., 2008, p. 711)

function, and were less likely to walk. The study found that "those who did not find a sense of Ikigai were associated with an increased risk of all-cause mortality, independent of socioeconomic factors, other psychological factors, physical function, lifestyle habits, and history of illness" (p.713).

Significant benefits on the physical and mental health of Ikigai were also reported by the latest systematic literature review by Kotera et al. (2021). For instance, in times of the COVID-19 pandemic, Trzebiński et al. (2020) report that higher levels of meaning in life were associated with lower levels of anxiety and distress.

Given the associations between Ikigai and improved physical and mental health and well-being, it is fortunate that it can be enhanced through interventions, such as career guidance and well-being training (Kotera et al., 2021). These interventions include reflection on one's values, passions, and goals, visualizing the best possible self, and goal attainment plans (Schippers and Ziegler, 2019). This brief introduction of the theory and research about Ikigai provides a foundation for discussing potential links between Ikigai and entrepreneurship.

### 6.3.3 Relevance for Entrepreneurship

After entering, analyzing, and presenting the research field related to the Ikigai framework, it is essential to understand how Ikigai is related to entrepreneurship, how the entrepreneurship research community uses the Japanese concept, and how practitioners can benefit from it. Therefore, the search results of the bibliometric analysis concerning the connection between Ikigai and entrepreneurship are presented in table 6.6. As mentioned above, scientific databases showed no results for the search string "Ikigai AND entrepreneur\*". From 525 hits in Google Scholar, only six were associated with both fields and were included in the final list for content analysis. Given the associations between Ikigai and improved physical and mental health and well-being, it is fortunate that it can be enhanced through interventions, such as career guidance and well-being training (Kotera et al., 2021). These interventions include reflection on one's values, passions, and goals, visualizing the best possible self, and goal attainment plans (Schippers and Ziegler, 2019). This brief introduction of the theory and research about Ikigai provides a foundation for discussing potential links between Ikigai and entrepreneurship.

Author	Title	Type
Raessi (2021)	Using the Ikigai Model to Create Efficiency During Entrepreneurial Business Opportunity Recognition	Conceptual paper
Mahad et al. (2021)	Ikigai as a tool to amplify an aspiring entrepreneurial intention	Inproceedings
Wibowo and Bernardus (2018)	The effect of competency on the professionalism of the intrapreneurs of ciputra university with sense of Ikigai as the moderator	Conference paper
Schippers (2017)	IKIGAI: reflection on life goals optimizes performance and happiness	Book
Fabritius (2017)	Ventures for a better society; 4th entrepreneurial revolution	Master Thesis
Kacy (2018)	Ikigai For Entrepreneurs	Blog article

Table 6.6: Publications connecting Ikigai and entrepreneurship identified through a systematic manual search in Google Scholar

One of the latest and most relevant sources is the conceptual paper "Using the Ikigai Model to Create Efficiency During Entrepreneurial Business Opportunity Recognition" by Raessi (2021). In her work, Raessi builds on the connection between two bodies of work: entrepreneurial business opportunity recognition and Ikigai as a Japanese "frame of mind" (p. 3). Referring to Win (2014), she presents Ikigai as a "recently popular business model" (p.

2). However, as presented above, Ikigai has no initial associations with the business domain. Core concepts that help her to create a combined model for opportunity recognition are:

- Vocational identity (Holland, 1997; Galles et al., 2019),
- Mindfulness and introspection (Shapiro et al., 2006; Burkart, 2018; Galles et al., 2019),
- The role of relevant knowledge (prior industry knowledge and market insights) in opportunity recognition as a decisive factor (Baron, 2006; Shane and Venkataraman, 2000; George et al., 2016; Filser et al., 2020), and
- The specific phases in opportunity recognition (opportunity recognition, evaluation, and exploitation) (Moberg et al., 2014; Sadler-Smith, 2016).

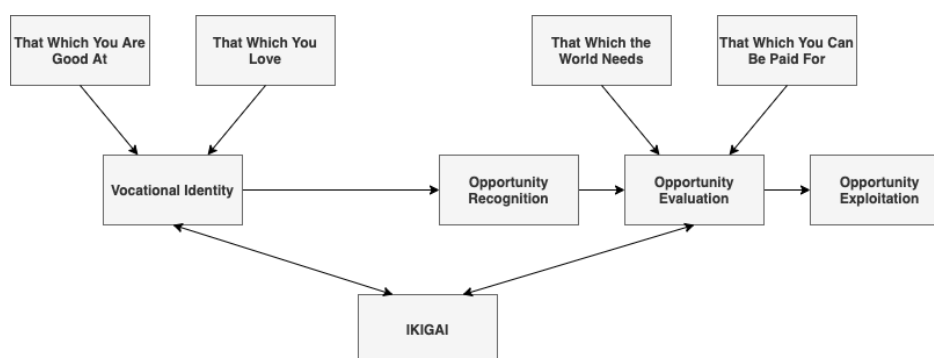


Figure 6.9: Framework proposed for entrepreneurial business opportunity recognition. Source: Raessi (2021, p. 15)

Vocational identity is defined by Holland (1997, p. 42) as "the possession of a clear and stable picture of one's goals, interests, personality, and talents". In his theory, the author explains why and how individuals make career, work-related, and life decisions and why specific environments are better matched to specific individuals and vice versa. Mindfulness and introspection help individuals better understand their interests, intentions, and job-related preferences. Therefore, they create stronger vocational identities and experience fewer negative career thoughts and, as a result, higher levels of vocational identity (Galles et al., 2019; Burkart, 2018).

According to Holland (1997), vocational interests are expressions of personality. He argues that individuals make occupational choices based on compatibility with their predominant personality characteristics (realistic, investigative, artistic, social, enterprising, and conventional) measured by the Vocational Preference Inventory (Holland, 1978). A related or equivalent concept to Holland's theory of vocational personalities and work environments

which essentially investigates and predicts the person-work environment fit, can be found in the Entrepreneur-Opportunity Nexus concept by Shane (2003); Eckhardt and Shane (2010); Sarason et al. (2006). The entrepreneurial orientation on an organizational level by Miller (1983) (see Covin and Wales (2012); Anderson et al. (2015); Zhang et al. (2014a) for an in-depth review of the concept, scales, and definitions) and on the individual level (Bolton and Lane, 2012). Concerning opportunity recognition, the authors Shane and Venkataraman (2000); Venkataraman (1997) establish three critical components of the field: a) the *sources* of opportunities, b) the *processes* of discovery, evaluation, and exploitation of opportunities; and the *set of individuals* who discover, evaluate, and exploit them. According to Shane and Venkataraman (2000), the core of entrepreneurship resides in the nexus of opportunities and the individual. Similarly, the entrepreneur-opportunity nexus is represented by the link between the entrepreneurial intentions (personal level) and the context (external environment) by Bird and Jelinek (1989, p. 21):

"Entrepreneurial intentions are conceived as a link between the entrepreneur as an individual and the context within which a venture is created."

Based on the body of research presented above, Raessi (2021) argues that the concept and the definition of vocational identity can be associated and is in line with the two first categories of the Ikigai model: "What you love?" (one's possession of interests) and "What are you good at?" (possession of talents). Based on that, Raessi suggests pairing the two categories and evaluating them as one using the Vocational Identity construct by Holland (1997).

Furthermore, Raessi (2021) draws similarities between the concepts of opportunity evaluation and exploitation by Sadler-Smith (2016). Her proposed model is presented in figure 6.9). Another relevant work combining Ikigai with the entrepreneurship domain is presented by Mahad et al. (2021) (inproceedings). The authors attempt to analyze the links between Ikigai, passion, interest, and entrepreneurial intentions. The relevance of Ikigai for entrepreneurship is accurately described (ibid, p. 159):

"This approach aims to showcase a paradigm of entrepreneurship shifted such that every business is a combination of what we are good at, what we can be paid for, what the world needs and what we love."

The authors present a conceptual framework connecting the effectuation theory introduced by Sarasvathy (2001, 2009) to Ikigai and the entrepreneurial intention domain (Ajzen, 1991; Liñán, 2004; Shapero and Sokol, 1982) (see fig. 6.10).

In her internet blog "Ikigai for Entrepreneurs", Kacy (2018) reflects on the question: "What if the rising generation of entrepreneurs were equipped with a personal compass

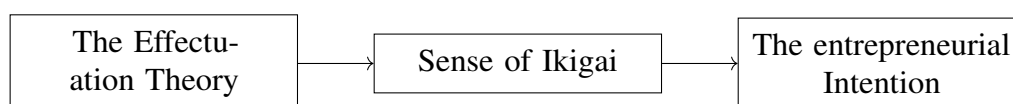


Figure 6.10: Conceptual framework suggested by Mahad et al. (2021, p. 160)

that helped them translate individual purpose and professional skills into social impact, while also making a profit?" Interestingly, she uses related terms associated with Ikigai and highlights their role, and points out the relevance for entrepreneurs:

"In entrepreneurship, more so than in other employment scenarios, the personal and the professional are deeply connected. Before you can make an honest assessment of your professional strengths, weaknesses, talents, values, and passions, (or those of your startup) you should consider your personal strengths, weaknesses, talents, values, and passions. The same way that we look at the business' strategy, mission, vision, core competencies, and competitive advantage, we can look at the entrepreneur's differentiation, purpose, capabilities, passions, operating methods, and life experiences. What matters to you? What are you willing to fight for? What can you uniquely offer that others cannot? What do you innately understand? What are you bad at?"

Based on different configurations of the Ikigai components, the author presents an evolution of entrepreneurship from traditional and profit-oriented focus to "Ikigai-driven social entrepreneurship" covering all four components in figure 6.11).

In their study, Wibowo and Bernardus (2018) use a statistical model to investigate the effects of competency on the professionalism of intrapreneurs and the sense of Ikigai as a moderator. The sense of Ikigai construct was measured with the following items based on Park (2015):

- feels that he/she has a *belief system* that can lead his/her life
- feels that life's challenges are *meaningful*
- feels that what he/she has done is *useful to others*, to his/her family, or to the world
- feels that his/her family or other people believe that he/she can pull off *important and meaningful* matters for them

The sample includes 60 employees of Ciputra University in Indonesia. As a result, the study shows that the competency variable positively and significantly affects intrapreneurs' professionalism. In contrast, the effect of Ikigai as a moderator for competency and professionalism has been evaluated as insignificant. Instead, Wibowo and Bernardus (2018) argue that

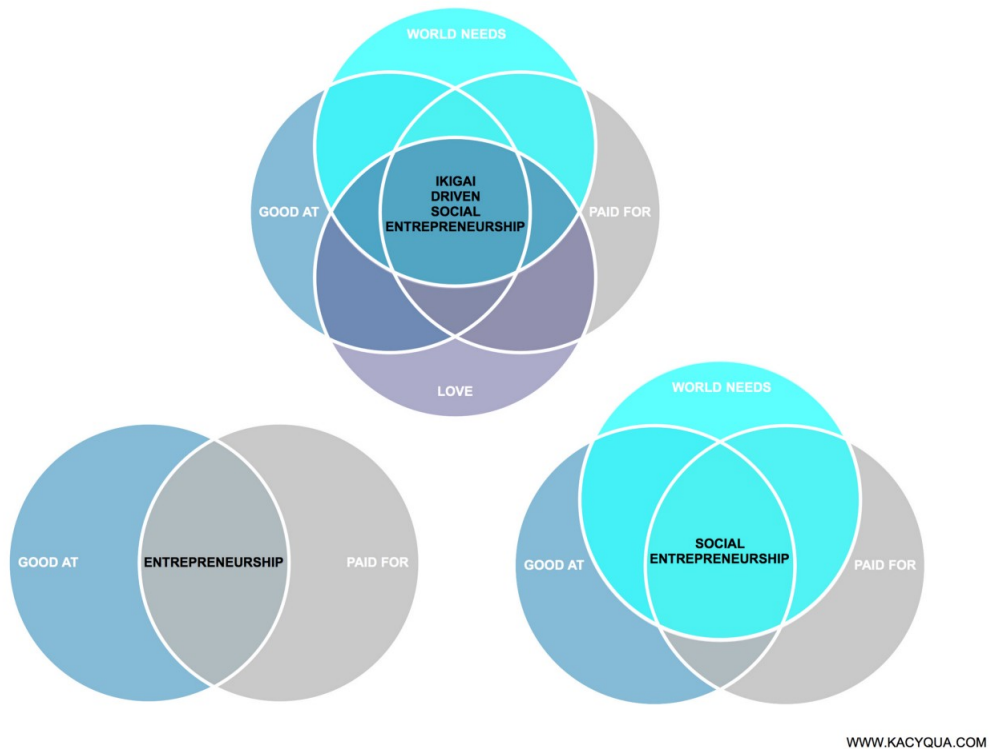


Figure 6.11: Moving from Entrepreneurship to Social Entrepreneurship to Ikigai Driven Social Entrepreneurship (Kacy, 2018)

"Based on this result, sense of Ikigai can be a predictor variable which in the future can be examined to see its effect on professionalism or as an intervening variable between competency and professionalism" (p. 99).

In her book, Schippers (2017) describes the positive effects of individual and team reflection on life goals as an effective tool to improve working performance and increase happiness. It is a profound source of scientific evidence on self-regulation, finding purpose in life, and reflection and goal-setting theories. Authors argue that setting up and working towards common and meaningful goals are crucial in the 21st century (Steger et al., 2012) (see Mathieu et al. (2017) for an in-depth review of factors affecting teamwork performance, including common goals and values). Mathieu et al. (2017, p. 461) defines teams as "an arrangement of people brought together to accomplish one or more common goals, are interdependent, and function in organizational contexts. In addition to that, Schippers (2017) presents and discusses critical terms such as "team composition" and the positive effects of "team-reflexivity" as important "self-regulatory" behaviour that enhances individual, team, and even organizational performance. Thus, the role of Ikigai in goal setting and goal achievement on personal and team levels and finding a purpose in life is vital. Therefore,

the relevance of Ikigai for entrepreneurship is in its impact on team configuration, harmony, effectiveness, goal identification and orientation, and performance.

In summary, it can be said that the bibliometric and the literature analysis provided critical insights into the main body of the scientific research field and its positive effects on mental and physical well-being. In addition to that, it could be shown that Ikigai is highly relevant for entrepreneurship and was conceptualized and examined by authors in association with the entrepreneurship domains presented in figure 6.12.

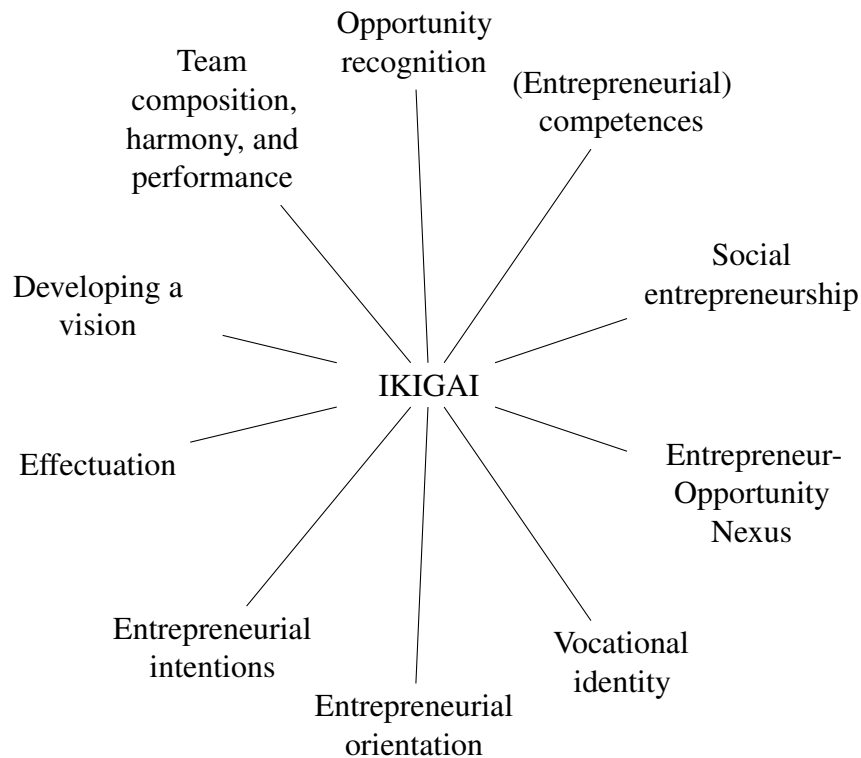


Figure 6.12: Association of Ikigai with entrepreneurial topics and recommendations for future research

Based on the analysis and insights presented above, it can be concluded that the Ikigai framework has several *potential* benefits for entrepreneurship. It can help entrepreneurs to find their purpose in life and their vocational identity through introspection and personal reflection, providing a "personal compass" (Kacy, 2018) to discover and evaluate business opportunities. Including the dimension "What the world needs" can help create meaningful and inspiring business visions, develop products that impact people and the planet, and motivate entrepreneurs to pursue the business idea and exploit the opportunity. In addition to that, clarity about "what you love", "what you are good at", "what the world needs", and "what you can be paid for", can positively affect subjective well-being (SWB) since it *potentially* contributes to a clear vocational identity, job satisfaction, and in turn to a

SWB (Don Gottfredson and Duffy, 2008). Finally, the person-related Ikigai components ("What you love" and "What you are good at") are a balanced counterpart of environment and market-related components ("What the world needs" and "What you can be paid for") that can be associated with the Entrepreneur-Opportunity Nexus (Shane, 2003; Eckhardt and Shane, 2010; Sarason et al., 2006).

### **6.3.4 Discussion**

This chapter presents selected instruments and methods of modern entrepreneurship, such as Design Thinking, Lean Startup, Business Model Canvas and Effectuation. It evaluates the tools based on the Entrepreneur-Opportunity Nexus approach considering the personal/internal and external view addressed in the respective framework. The Entrepreneur-Opportunity Nexus is described as a coherent link between personal and external levels. Our analysis shows that modern entrepreneurship approaches interpret human centrality mainly from the customer-centred perspective. Unfortunately, founders and employees are currently not considered sufficiently in the entrepreneurial processes, tools and methods taught in modern entrepreneurship education. It could become significantly more critical now as Generation Y and Z enter universities and the labour market. For them, the purpose and meaning in life and their work environment are more substantial than it was for previous generations. Due to its positive effects on the individual and teams and its combination of internal and external components, the traditional approach of Ikigai shows excellent potential to fill the existing void of founder-centricity in modern entrepreneurship.

As a result of the bibliometric analysis it can be said that within the academic communities, Ikigai appears as a very niche topic with a small but international research outreach. However, data show that scholars' interest in Ikigai as a research topic has rapidly increased in recent years. Its potential to help with the challenges of modern life seems to be just recently discovered and is growing in reputation. Considering the study's results, we describe Ikigai as the inherent interplay of four dimensions that integrate the individual and the environmental aspects. When looking at its four dimensions, the individual components of "What you love" and "What you are good at" are holistically integrated with the environmental-related components "What the world needs" and "What you can be paid for". Studies have shown the positive effect of the sense of Ikigai on subjective well-being and happiness. Research also indicates that Ikigai is related to physical and mental health benefits. As a result of balancing the four dimensions, higher levels of meaning and positive emotions are created, which are also associated with lower levels of anxiety, distress and reduced risk of all-cause mortality.

Referring to the SQ 1.3, the analysis shows only a few very recent publications. Therefore, we have the impression that combining Ikigai with entrepreneurship is just being



discovered as a powerful connection. Arguments that we find in this literature support the fact that personal and professional life is primarily connected to entrepreneurship (Kacy, 2018). Mahad et al. (2021) even conclude that Ikigai (the balance of all four dimensions) is necessary to build a business. It can be learned from Raessi (2021) how Ikigai could be integrated with a first vocational identity-building step that precedes the entrepreneurial business opportunity recognition process. She further suggests a personal compass that helps translate individual purpose and professional skills into social impact with profit-making. The study by Wibowo and Bernardus (2018) also shows that the balance of internal and external components plays a crucial role for intrapreneurs. Schippers (2017) indicates that Ikigai plays a relevant role in goal setting and achievement on a personal, team and even organizational level. Finally, the associations that are drawn in these articles show links to many aspects that are central in entrepreneurship education: such as entrepreneurial intentions and orientation, effectuation, developing a vision, team performance, opportunity recognition, entrepreneurial competences, social entrepreneurship, Entrepreneur-Opportunity Nexus and vocational identity.

Based on the research and practical experience in education, mentoring and coaching, it can be argued that modern entrepreneurship needs more focus on the currently under-represented part of the founder, who is supposed to create a new venture. We have learnt from the comprehensive approach of Ikigai that it can be integrated into current entrepreneurship tools and methods. And in doing that, Ikigai can serve as an inner compass and a foundation that – if it is linked to opportunity evaluation and exploitation – results in a more holistic entrepreneurship education and execution of entrepreneurial activities.

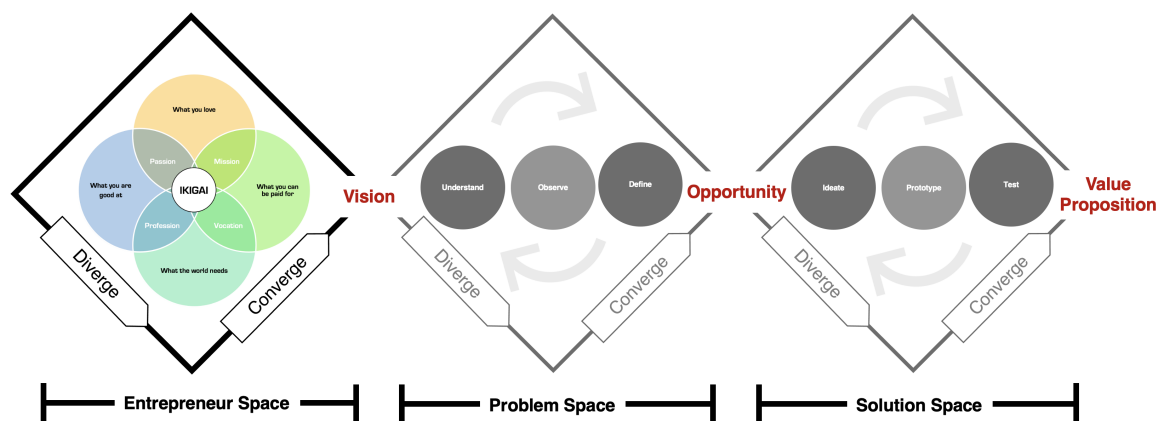


Figure 6.13: Triple Diamond Model for modern Entrepreneurship. Inspired by the Ikigai framework (Myers, 2018), the Design Thinking approach by HPI (2023) and the UK Design Council’s Double Diamond Design Thinking Model.

Our entrepreneur-centred triple-diamond approach (see fig. 6.13) is inspired by the Double Diamond Design Model by UK Design Council Council (2023). It complements

the previous existing problem and solution spaces with a third space, the entrepreneur space. In this space, the focus lies on the entrepreneurial individual and their potential, motivation and resources that can benefit the entrepreneurial endeavour. Therefore, including a third diamond provides the space to take a resource-oriented perspective and to connect competences and mindset for more holistic entrepreneurial activities. Working with the knowledge and interventions from positive psychology and creating a sense of Ikigai is part of the first diamond. As effects are valid for individuals, teams, entrepreneurship projects and all other working and living areas, this new perspective and approach can be seen as a treasure trove for radiation effects: Transformational leadership theory, student-centred pedagogies, entrepreneurship support programs, person-occupation fit approaches and methods that help in designing and defining a meaningful future (e.g., Life Design) can benefit from the triple diamond approach. Using Ikigai and proposing the entrepreneur space, we integrate Life Design into the entrepreneurial process. Moreover, it was shown that an inspiring and desirable business idea increases students' motivation to realize the business idea, teamwork performance and commitment to work on their startup projects. Including an entrepreneur space and expanding the inspiration and desirability of the business ideas could enhance grit, focus, motivation and teamwork performance.

Higher levels of meaning are associated with lower anxiety and stress levels. As a result, it leads to better brain functioning, innovation capacity and leadership skills needed for successful entrepreneurship. If Ikigai balances inner and external components and combines them with entrepreneurial intention, we assume that the entrepreneurial intentions and activities should enhance the role of responsibility and impact (making the world a better place) in modern entrepreneurship.

### **6.3.5 Limitations and implications for future research**

Although developing an "entrepreneur space" has significant implications for entrepreneurial education and beyond in the future, this article has various limitations. First, the article base selected was limited through the choice and selection of the databases, and the criteria applied. Further studies could add other databases like "ABI/Inform Global "or "EBSCO" and criteria like "Self-actualization" to mitigate this limitation. Second, this paper explores only a small and maybe biased selection of entrepreneurial methods in combination with aspects of Ikigai. Therefore, future studies should integrate emerging methods like "Art Thinking" - in which the "creators", their values, their expertise, and their intentions are crucial (embodiment phase) and Life Design - an entrepreneurship tool for personal development.

Furthermore, this paper has not yet defined the entrepreneur space itself in detail, what it is for and what its benefits are and little scientific and interdisciplinary research has been conducted to connect entrepreneurship and the Ikigai domain. In addition, current research

on Ikigai discusses what it is and which effects it can have, but how to develop a sense of Ikigai is still an undiscovered field. For example: There are probably more than four dimensions in the inner view that could be important for crucial self-reflection about oneself in entrepreneurship, such as resources and values. For that reason, the dimensions and components of the Ikigai framework should be discussed in detail to develop and validate a theoretical model with valid and reliable constructs for operationalization and assessment in an entrepreneurship context. Therefore, we suggest that future studies focus on the definition and the approaches of the entrepreneur space and the connecting elements to Ikigai and the problem space. Fourth, no new qualitative or quantitative data was gathered for this paper. We suggest that future studies should do so as this could clarify the potential that lies in the entrepreneur space. In sum, further investigation of the aspects mentioned above could expose the importance of the new element, namely the entrepreneur space, as key to enabling innovation.

Although various potential positive effects of Ikigai can be applied to entrepreneurs, their health and well-being, and their long-term success, little scientific and interdisciplinary research has been conducted to connect entrepreneurship and the Ikigai domain and validate these effects. For that reason, the dimensions and components of the Ikigai framework will be discussed in detail to develop, and validate a theoretical model with valid and reliable constructs for operationalization and assessment in an entrepreneurship course with focus on opportunity recognition.

## **6.4 Development of an Assessment Instrument**

Before developing the instructional design for the opportunity recognition course framework, an assessment instrument needs to be designed. Addressing the core challenge of the study presented in previous chapters, the assessment instrument is intended to measure the role and impact of the Ikigai components on students' perceived desirability of the business idea. For that, the Ikigai constructs and their representing items need to be specified for formal measurement. The main intention models and their underlying constructs have been reviewed in chapter 2. However, the question of which appropriate measures and constructs represent the Ikigai framework remains. For that reason, the scales and items representing the Ikigai constructs are developed and then iteratively tested in the following sections. Constructs and items are then used to develop and test a Structural Equation Model (SEM). Based on the underlying conditions of the study (e.g., number of respondents, nature of measurement model etc.), the type of the SEM approach (Co-variance based (CB-SEM) vs. Partial Least Square method (PLS-SEM)) will be defined.

Authors agree that developing a sound, valid, and reliable questionnaire requires extensive effort, time, and diligence. Effective measurement is a cornerstone of scientific research (DeVellis, 2016; MacKenzie et al., 2011; Netemeyer et al., 2003). In their study, however, (Slavec and Drnovšek, 2012, p. 48) shows significant shortcomings in the quality of measures used in entrepreneurial studies:

*"Among the 1171 measures reported in 98 empirical papers from our study (1) one third (32.7%) of the measures reviewed were neither developed nor previously used and cannot be counted as appropriate since they were neither referenced nor developed measures and (2) when developing new measures several steps were omitted and again such new measures are problematic."*

Therefore, the following chapters follow the scale development standards suggested by DeVellis (2016); MacKenzie et al. (2011); Netemeyer et al. (2003); Boateng et al. (2018); Zamanzadeh et al. (2015). The authors follow a deductive approach to developing scales in their suggested process. Deductive scale development uses a theoretical definition of a construct which is then used as a guide for the creation of items (Schwab, 1980). In contrast, an inductive approach is used if the domain provides little theory or existing scales (Hinkin, 1995). To conceptualize the Ikigai framework, both deductive and inductive methods are applied. With respect to the definition of the constructs, MacKenzie et al. (2011, p. 299) recommend considering the following aspects:

- Provide clear, concise conceptual definition of the construct
- The construct should not be subject to multiple interpretations
- The construct should not be overly technical (technical terms with narrow meanings)
- The author should define construct positively, not by the denial of other things; negation of one thing does not imply the affirmation of something else
- The construct should not be circular or tautological or self-referential

The constructs are used to operationalize the Ikigai framework, develop latent and manifest variables and the specific items which define and represent the latent constructs. The formation of constructs is the basis for developing a theoretical model to measure relationships and test the underlying hypotheses. The theoretical and/or factual foundation of hypotheses characterizes the initiation of structural equation modelling. Therefore, endogenous and exogenous latent variables need to be defined. Constructs are defined by drawing on existing and established theories and validated theoretical constructs. In practice, however, conceptualization is often carried out on the basis of experience and, above all,

plausibility considerations grounded in factual logic (Weiber and Mühlhaus, 2014). The procedure follows the scale development process suggested by (MacKenzie et al., 2011, p. 297), which is presented in figure 6.14.

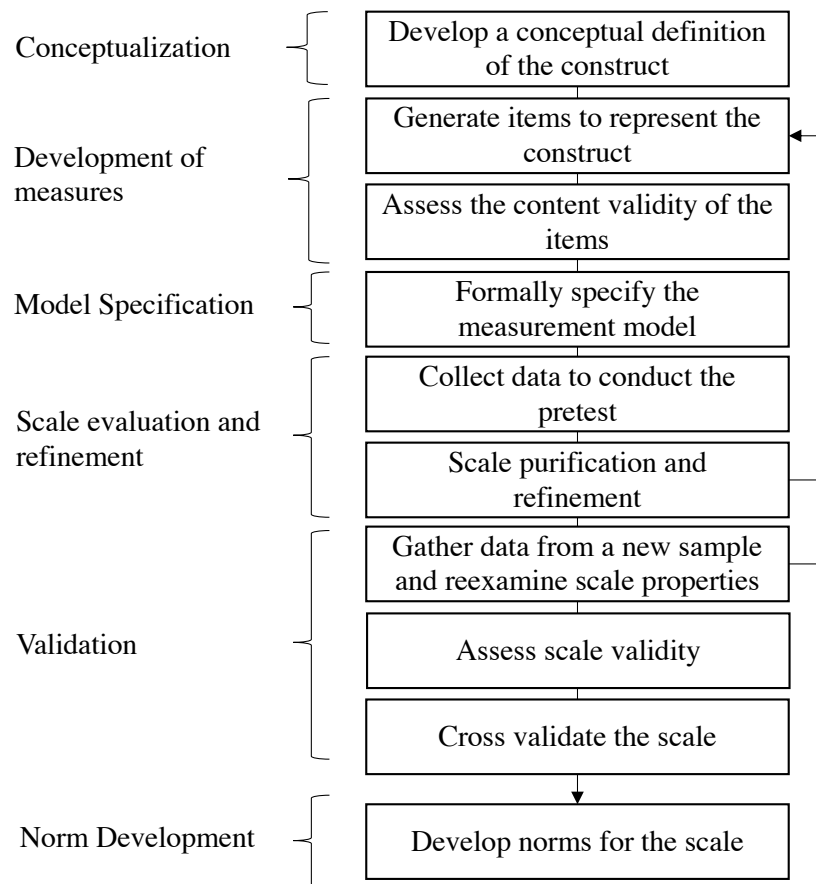


Figure 6.14: Scale Development Process suggested by MacKenzie et al. (2011, p. 297) Own modification in graphical presentation.

## **Construct Conceptualization**

According to MacKenzie et al. (2011), the construct conceptualization aims to define a construct clearly and precisely to operationalize the measurement on three different levels:

1. Subject (Target group)
2. Object (What is being assessed and evaluated?) and
3. Attribute (Which object characteristics should be assessed and evaluated by the subjects?)

## Definition of Subject Level

In defining the construct, it is necessary to consider which situations and people a theory is aimed at. Furthermore, the operationalization of latent constructs requires a clear definition of the target group since the set of observable indicators is to be derived, and the linguistic formulation of indicators depends heavily on the defined target persons. Concerning the aim and objectives of the empirical study, participants of the educational offers in the context of entrepreneurship education at the KIT are defined as the target group. The theoretical model and the underlying hypothesis need to be compatible with the target group of the study to capture relevant, valid, and reliable responses to the questions. Therefore, the respondents and the study context are characterized in the following section. As described in section 6.7.3, academic entrepreneurial courses are offered at Bachelor (undergraduate) and Master (graduate) levels. Students take entrepreneurship courses as part of their mandatory study programs or as elective courses.

Bachelor's Students want to do the first steps and get in contact with the topic, learn basic concepts, tools and methods for customer and product development, idea validation, and Business Plan development. The general motivation is guided by the following questions:

- What is entrepreneurship?
- What do I need to know to become a successful entrepreneur?
- Which skills do I need to have to become a successful entrepreneur?
- Which character traits do entrepreneurs have?
- What can I expect from an entrepreneurial working environment and how does it feel to create your own startup?
- What are the steps in creating your own startup?
- Is entrepreneurship a potential career path for me?

During their Master's studies, students at the KIT choose their elective subjects to fulfill their study plans. One of the course offerings is the Entrepreneurship module consisting of a theoretical entrepreneurship lecture and different practice-oriented and simulative courses. In addition to Bachelors topics, course participants are guided by the following guiding questions:

- How to apply theoretical knowledge in practice?
- How to find a valuable business opportunity?

- How to develop a promising business idea?
- How to estimate the market potential?
- What is a valuable business opportunity?

In these early stages, the pedagogical objectives are to inform students about entrepreneurship as a career option, to raise their attention to the topic, create relevance and experience an entrepreneurial journey by simulating the early phase of a startup and finally enabling them to act as responsible entrepreneurs in the context of new technologies and emerging needs.

### **Definition of Object Level**

With respect to the object of the measurement, the participants assess and evaluate the following constructs derived from Ikigai, the entrepreneur-opportunity nexus, and other supporting topics presented in table 6.7. The main object and the output variable to be assessed is the desirability of the business idea developed in class. The Ikigai and supporting constructs can be associated with person-related and business idea-related factors as presented in table 6.7. It presents the operationalization of the constructs and the supporting constructs needed to measure the Ikigai model and the Entrepreneur - Opportunity Nexus. In the next chapter, a detailed operationalization and the construct definition is presented.

## **6.5 Operationalizing Ikigai**

The operationalization of latent constructs aims at finding suitable and appropriate indicators of the latent theoretical constructs for measurement. In order to cover all formative aspects of a construct, it is essential to define it as broadly and at the same time as precisely as possible, i.e., by naming all relevant facets. The researcher has different approaches to this project, such as preliminary qualitative investigations such as case studies, interviews, and surveys of experts or raters (e.g., in the context of focus groups). It is also essential to describe the relationships between the facets. In any case, it makes sense to study the literature on the subject. It is advisable to record the definition in writing in all its complexity, as this makes it easier to identify unclear aspects and creates a basis for discussions (Christophersen and Grape, 2009). The definition and operationalization of the respective constructs were performed in several iterations, including identifying relevant theoretical backgrounds in psychology, economy, and entrepreneurship, as well as several discussions with experts familiar with the Ikigai framework at the KIT and Albert-Ludwigs- University. In the following sections, the four main guiding questions I) "What you love" II) "What you are

good at?", III) "What you can be paid for" and IV) "What the world needs?" are discussed and operationalized with established and new measurable constructs.

### 6.5.1 What you love?

According to Ikigai, doing what you love is one of the four pillars of well-being. The framework claims that identifying and doing what you love will result in better work and life satisfaction. It implies that the respondent should think and reflect on things that are meaningful to him or her. Answers to that question, however, could be very diverse. A potential answer of a respondent to the question "What you love" could be a favourable statement about or an expression towards objects (e.g. cars), activities (e.g. biking), events (e.g. classical concerts), social institutions (e.g. family), or feelings and emotions (e.g. happiness). In entrepreneurship, meaningfulness also plays an essential role on the individual level. In their study, Wach et al. (2016) investigated the concept of entrepreneurial success by asking 185 entrepreneurs what success means to them. In this respect, the authors define subjective entrepreneurial success as "the individual understanding and assessment of the achievement of criteria that are personally important to the entrepreneur" (Wach et al., 2016, p. 1099). A concept studied for many years and validated through intercultural research in many countries worldwide is the concept and theory of fundamental human values by Schwartz (1992). According to (Schwartz, 2012, p. 3), values reflect what is essential to the individuals in their life:

"When we think of our values, we think of what is important to us in life" .

Moreover, values are assumed to influence human decisions and career choices (Dietz et al., 2005; Schwartz, 1992). In their work, Liñán and Fayolle (2015) reflect on the role of personal values and their effect on an individual's willingness to pursue entrepreneurial opportunities and identify a clear relation and a significant relevance of the two domains: Personal values and opportunity recognition. In his studies on personal values, Schwartz (2012) identified ten intercultural values in 82 countries that characterize cultural groups, societies, and individuals to explain the motivational bases of attitudes and human behaviour. These values are Self-Direction, Stimulation, Hedonism, Achievement, Power, Security, Conformity, Tradition, Benevolence, and Universalism. The conceptual connection between "what you love" stated by Ikigai and personal values becomes more evident by considering the following six features of values presented by (Schwartz, 2012, p. 3):

1. Values are beliefs linked inextricably to affect. When values are activated, they become infused with feeling. People for whom independence is an important value become aroused if their independence is threatened, despair when they are helpless to protect it, and are happy when they can enjoy it.



2. Values refer to desirable goals that motivate action. People for whom social order, justice, and helpfulness are important values are motivated to pursue these goals.
3. Values transcend specific actions and situations. Obedience and honesty values, for example, may be relevant in the workplace or school, in business or politics, with friends or strangers. This feature distinguishes values from norms and attitudes that usually refer to specific actions, objects, or situations.
4. Values serve as standards or criteria. Values guide the selection or evaluation of actions, policies, people, and events. People decide what is good or bad, justified or illegitimate, worth doing or avoiding, based on possible consequences for their cherished values. But the impact of values in everyday decisions is rarely conscious. Values enter awareness when the actions or judgments one is considering have conflicting implications for different values one cherishes.
5. Values are ordered by importance relative to one another. People's values form an ordered system of priorities that characterize them as individuals. Do they attribute more importance to achievement or justice, to novelty or tradition? This hierarchical feature also distinguishes values from norms and attitudes.
6. The relative importance of multiple values guides action. Any attitude or behavior typically has implications for more than one value. For example, attending church might express and promote tradition and conformity values at the expense of hedonism and stimulation values. The trade off among relevant, competing values guides attitudes and behaviors. Values influence action when they are relevant in the context (hence likely to be activated) and important to the actor.

In addition to that, the American Psychological Association Dictionary of psychology<sup>2</sup> defines value as "a moral, social, or aesthetic principle accepted by an individual or society as a guide to what is good, desirable, or important". Therefore, personal values are a qualified and well-established psychological construct to represent the "What do you love?" domain. In the context of the study, it is hypothesized that a perceived fit between personal values and the business idea positively affects attitudes towards the business idea. It is therefore included in the constructs of the updated model.

### **Clarity about your personal values**

In order to measure the personal values- business idea fit construct, the participants first need to be aware and informed about their values. Therefore, "clarity about the personal

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<sup>2</sup><https://dictionary.apa.org/value>. Retrieved: 29.04.2021

values" needs to be measured first. Before assessing and evaluating the student participants' personal values, the respondents must be aware of and well-informed about them. To ensure that and reflect on their personal values, the participants conduct a validated personal value quest at the beginning of the workshop<sup>3</sup>. As a result, participants receive an individual profile of their values that indicates the self-assessed level and importance of the respective values. Based on that, the participants can reflect on the personal values presented by their profiles and assess the clarity of their personal values in the underlying study to evaluate the clarity about their values. Therefore, the first question addresses the clarity about personal values to ensure that the candidate knows the underlying subject. A 7-point Likert scale is used to indicate the level of clarity. In addition, the participants are asked to write down their three most important personal values according to their underlying profile to internalize them (optional).

For the definition of the items, two questions from the engaged living scale by Trompetter (2014, p. 75) were adapted and included, directed towards the meaning of life and the level of motivation gained through the values. The items used to measure the clarity of personal values are presented below. As an optional question, PV00 is introduced to participants who did not perform an in-depth reflection on their personal values in an educational setting. According to MacKenzie et al. (2011, p. 298), "the first stage of the scale development and validation process involves defining the conceptual domain of the construct". Moreover, the nature of the construct needs to be captured and specified by the researcher (ibid). Therefore, the construct "Clarity about the personal values" is defined as the individual's knowledge about what is important to him or her and what motivates the individual in his or her life.

## 6.5.2 What you are good at?

Many terms and concepts have been established in theory and practice that refer to the second guiding question: "What are you good at?". Related terms often used interchangeably are: abilities, capabilities, skills, talents, personal strengths or competences. A detailed literature analysis and critical discussion on competence, its categories, components and definitions have been conducted by (Tittel and Terzidis, 2020). It shows that the concept of competence can be used in many contexts and has different functions. For instance, it is used for accreditation, authorization, certification and qualification (Mulder, 2007). In educational science, competence is considered a key concept to be developed in primary and higher education. Therefore, competence can be considered an appropriate and well-established construct to represent the second Ikigai guiding question: "What are you good at?" As discussed and presented in chapter 4, competence is based on three key components: knowl-

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<sup>3</sup><https://www.findyourvalues.com>

**Items on: Clarity about the personal values**

PV00 (Optional): With respect to your personal value profile, please note your three most important values:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

Please indicate your level of agreement with the following statements from 1 (total disagreement) to 7 (total agreement).

ID	Item
PV01	I know my most important personal values
PV02	I know what is important to me in my life
PV03	I know what motivates me in life

[1 = strongly disagree; 2 = disagree; 3 = somewhat disagree; 4 = undecided; 5 = somewhat agree; 6 = agree; 7 = strongly agree]

Figure 6.15: Items on: Clarity about the personal values. Adapted from engaged living scale by Trompetter (2014, p. 75)

edge, skills and attitudes. Using the concept of competence, the Ikigai guiding question: "What are you good at?", could be associated with "What are your core competences?"

## Clarity about the Core Competences

"What are you good at?" is operationalized by the concept of competence. The definition developed by Tittel and Terzidis (2020) addresses the three dimensions of competence (knowledge, skills, and attitudes). Additionally, two questions are adapted from Govindji and Linley (2007, p. 147) and refer to the clarity about the deployment of one own competences in variable situations. As an optional item, C00 can be introduced to initiate the reflection on the core competences and objectively capture the three most developed competences. The construct "Clarity about the core competences" is defined as the individual's knowledge about their knowledge, skills and attitudes relevant to solving entrepreneurship-related challenges. The items are presented in figure 6.16.

Items on: Clarity about the core competences

C00 (Optional): With respect to your core competence profile, please note your three most developed competences:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

Please indicate your level of agreement with the following statements from 1 (total disagreement) to 7 (total agreement)

ID	Item
C001	I know the things I am good at doing.
C002	I have knowledge that helps me solving problems in my professional life.
C003	I know my most developed skills.
C004	I know my attitude towards entrepreneurship.

[1 = strongly disagree; 2 = disagree; 3 = somewhat disagree; 4 = undecided; 5 = somewhat agree; 6 = agree; 7 = strongly agree]

Figure 6.16: Items on: Clarity about the core competences

### 6.5.3 What the world needs?

The next guiding question is, "What the world needs?" It is, therefore, useful to define the elements that are part of our world first. The online Collins Dictionary (Dictionary Collins, 2021) proposes a purposeful definition of the term "world":

- "The world is the planet that we live on".
- "The world refers to all the people who live on this planet, and our societies, institutions, and ways of life.

In a broader view, it includes all living organisms and their physical environment. The world is in constant change in different parts of our life. Different approaches have emerged in different disciplines to categorize our interconnected and diverse environment. Policy, economy, society, and technology (PEST) are established and widely used categories in management sciences and future studies to categorize the external environment. These factors can be considered sources of change and, therefore, new emerging needs.

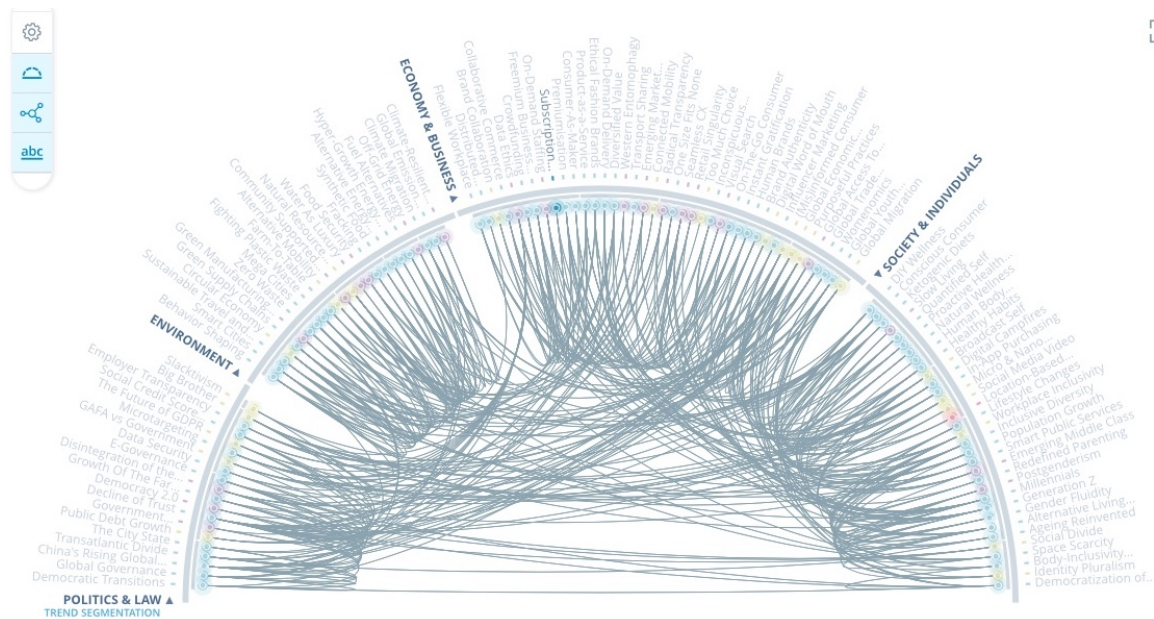


Figure 6.17: Trend Radar by IONICS

### Sources of Change as Indicators of Emerging Needs

A PEST analysis is a standard tool and a framework to analyze macro-economic factors to identify risks in the external environment for a project, a business or a firm's competitive position (Barbara et al., 2017). Different variations of the PEST framework were developed to widen the perspective and include additional fields and factors to consider. A synthesis of those frameworks yields the following factors: Policy (incl. Regulations and Legals) Economy, Society (incl. Demography), Technology, Ecology, and Ethics.

Similarly, corporate foresight and consulting companies provide future-oriented knowledge to their customers, analyzing trends and megatrends for strategic orientation. An example of the segmentation of the external environment can be drawn from the Trend Radar of the German Strategic Foresight company Z\_Punkt (see fig 6.17<sup>4</sup>). The sections used in the Trend Radar are I) Society and Individuals, II) Politics and Law, III) Environment, IV) Economy and Business. These sections can be considered sources of current or future trends and emerging needs.

### UN Sustainable Development Goals

Next to the sectoral categorization of our environment, a problem-oriented approach can refer to the question, "What the world needs?" The Sustainable Development Goals by the United Nations (UN SDGs) can serve as an appropriate source of inspiration and a great framework which explicitly defines what the world needs today and in the near future.

<sup>4</sup><https://www.itonics-innovation.de/trendradar>. Retrieved: 15.06.2020

The 17 UN SDGs were defined and adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy the peace and prosperity.<sup>5</sup> The 17 goals are (1) No Poverty, (2) Zero Hunger, (3) Good Health and Well-Being, (4) Quality Education, (5) Gender Equality, (6) Clean water and Sanitation, (7) Affordable and Clean Energy, (8) Decent Work and Economic Growth, (9) Industry, Innovation and Infrastructure, (10) Reduced Inequalities, (11) Sustainable Cities and Communities, (12) Responsible Consumption and Production, (13) Climate Action, (14) Life Below Water, (15) Life on Land, (16) Peace, Justice and Strong Institutions, and (17) Partnerships for the Goals. They are organized in the following five areas:<sup>6</sup>

1. **People:** End poverty and hunger, in all their forms and dimensions, and ensure that all human beings can fulfil their potential in dignity and equality and in a healthy environment.
2. **Planet:** Protect the planet from degradation, including through sustainable consumption and production, sustainably managing its natural resources and taking urgent action on climate change, so that it can support the needs of the present and future generations.
3. **Prosperity:** Ensure that all human beings can enjoy prosperous and fulfilling lives and that economic, social and technological progress occurs in harmony with nature.
4. **Peace:** Foster peaceful, just and inclusive societies which are free from fear and violence. There can be no sustainable development without peace and no peace without sustainable development.
5. **Partnerships:** Mobilize the means required to implement this Agenda through a revitalised Global Partnership for Sustainable Development, based on a spirit of strengthened global solidarity, focussed in particular on the needs of the poorest and most vulnerable and with the participation of all countries, all stakeholders and all people.

The SDGs cover social, economic, and environmental areas and directly link to the frameworks presented above. The SDGs form and present the heart of the 2030 Agenda, an action plan adopted by all 193 countries of the United Nations. To define the 17 Goals, over 10 Million people worldwide participated in the consultations run by the United Nations and helped shape the SDGs. Major stakeholder groups were consulted and had been given a voice: women, children, youth, indigenous peoples, NGOs, local authorities, workers and trade unions, business and industry, scientific and technological community, and farmers.

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<sup>5</sup><https://www.undp.org/sustainable-development-goals>. Retrieved: 05.05.2021

<sup>6</sup><https://sdgs.un.org/2030agenda>. Retrieved: 05.05.2021

## Trends and Mega Trends

Strategic foresight, scenario planning, and trend analysis have a long history. Institutionalized attempts to predict the future, the potential outcome of conflicts, and political decisions go back to the Oracle of Delphi in ancient Greece. In modern times, the Club of Rome, an interdisciplinary team of experts from more than 30 countries, has become an essential player in future studies. Established in 1968, the Club of Rome set its objectives to identify the most critical future problems of humanity and the planet through holistic, interdisciplinary and long-term research to evaluate alternative future scenarios and risk analysis. One of the famous future-oriented publications is the work "The Limits of Growth" from 1976 by Meadows et al. (2013). Today, future-oriented studies are established in political institutions (e.g. Office of Technology Assessment at the German Bundestag (TAB)), in companies (e.g. Siemens, Daimler, Deutsche Bahn, Z\_Punkt), and research institutes (e.g. Institute for Future Studies and Technology Assessment (IZT)<sup>7</sup>, Institute of Technology Futures at the KIT<sup>8</sup>).

In her book, Andersson (2018) presents an in-depth analysis of the emergence of the modern field of future studies. Both economic and scientific institutions are embedded in emerging international markets and face rapid social, environmental, technological, and economic change. To create future-oriented strategies, leaders of global organizations need to anticipate developments rather than react to conditions and changes in the environment. Therefore, they must scan and observe their political, social, economic, technological, and environmental conditions to assess and create future-orientated strategies.

Today, business and consulting companies, governmental and non-governmental organizations, and research institutions worldwide use methodologies such as scenario planning, Delphi studies, and trend analysis to reduce uncertainties, provide strategic orientation and generate future-oriented knowledge. With this, current global trends and megatrends play a significant role. Data, information and knowledge about global markets (e.g. electric mobility), consumer behaviour and product preferences (e.g. individual mobility in urban cities and fashion trends), or technological trends (industry 4.0, robotics or artificial intelligence) are key for the stakeholders to be best prepared for future economic and social conditions. The Cambridge Dictionary defines a trend as "a general development or change in a situation or in the way that people are behaving".<sup>9</sup> Saritas and Smith (2011, p. 3) characterizes trends as

"those change factors that arise from broadly generalizable change and innovation. They are experienced by everyone and often in more or less the same

<sup>7</sup><https://www.izt.de/en/>

<sup>8</sup><https://www.itz.kit.edu/english/index.php>

<sup>9</sup><https://dictionary.cambridge.org/dictionary/english/trend>. Retrieved: 07.05.2021

contexts insofar as they create broad parameters for shifts in attitudes, policies and business focus over periods of several years that usually have global reach."

However, a standard list of agreed trends does not exist. Instead, consulting companies, research institutes and universities develop trend reports and future-oriented insights according to their current projects and needs.

In their report Thieß Petersen (2019), the Bertelsmann Foundation presents three main megatrends: Globalization, Demographic Change, and Digitization. In addition, the following megatrends are presented by Statista, a German online platform for market research and statistics: Globalization, Cyber Security, Urbanization, Mobility, Demographic Change, Climate Change, Digitization, Energy, Artificial Intelligence, and Health. These trends and megatrends have a profound impact on our future lives. They, therefore, indicate the emerging need for future products and services to cope and adapt to our changing living and working environments. Based on that, trends and megatrends are other sufficient sources of inspiration to address the question: "What does the world need?" However, in economic terms, "the world" may refer to a market where demand and supply meet. Therefore, Perceived Market Attractiveness is introduced in the following section to characterize the guiding question: "What does the world need?"

### **Perceived Market Attractiveness**

In management science, an established concept to determine whether or not a market might be a profitable one for investment is the market attractiveness (Chandler and Hanks, 1994; Gleißner et al., 2013). It covers various determinants to assess the level of attractiveness of a specific market by identifying the current market size and its future growth, competitive situation, customer behaviour and perceptions, and the political and regulatory environment. The more attractive a market is assessed to be, the higher the profit potential. Market attractiveness includes future socio-economic developments and trends and is an appropriate candidate to operationalize and measure the Ikigai question: "What the word needs?" The theoretical model suggests that a higher score of "Perceived market attractiveness" directly affects the attitude towards the business idea. In an attractive market, the entrepreneur would feel more likely and confident to start and realize the business idea in the future.

It is often a vital and challenging question for established companies to enter specific markets with new products or not. As a place for demand and supply, the market often dictates the success or failure of new product introductions or companies. For that reason, scholars in the managerial literature suggest frameworks for estimating and understanding the dimensions of market attractiveness. A market is evaluated as attractive if there is an opportunity for an organization to achieve its goals and objectives (Cromley et al., 1993). In other words, market attractiveness is "the degree to which a market offers opportunities



to an organization, taking into account the market size and growth rate and the level of competition and other constraints" (Monash, 2022). Based on that, market attractiveness is defined here as a positive or negative assessment of key market characteristics, such as market size, market growth, the intensity of competitors, market entry barriers, and the threat of substitutes. Figure 6.18 presents the items to measure the market attractiveness.

Items on: Perceived Market Attractiveness	
Referring to the underlying business idea, please estimate the following questions from 1 (very low) to 7 (very high)	
ID	Item
PMA01	Indicate the anticipated market size for your offering.
PMA02	Indicate the anticipated market growth in the next 5-10 years.
PMA03	Indicate the anticipated intensity of your competitors.
PMA04	Indicate the anticipated entry barriers to the market.
PMA05	Indicate the anticipated threat of substitutes affecting your offering
[1 = Very low; 2 = fairly low; 3 = somewhat low; 4 = undecided; 5 = somewhat high; 6 = fairly high; 7 = very high]	

Figure 6.18: Items on: Perceived Market Attractiveness

The "favourable circumstances" and the criteria for an attractive market on the other hand are described along the dimensions of market potential, competition, and the industry structure/economic factors (Cromley et al., 1993). Similar factors can be found in Porter's Five Forces Framework for the analysis of competition of a business (Porter and Strategy, 1980; Porter, 1989, 2008). According to Porter, there are five forces that determine the competitive intensity and, therefore, the attractiveness of an industry or market in terms of its profitability: I) The Power of customers, II) Threat of substitute products or services, III) Bargaining power of suppliers, IV) Threats of new entrants, V) Competitive rivalry. In addition to that, the time dimension needs to be considered. Since the innovation cycles of technology increase, social, demographic, economic, and ecological circumstances changes, there can be favourable and unfavourable timing for product introduction and market entry for young companies and established firms.

*H1*: The higher the perceived market attractiveness, the higher the perceived desirability of the business idea.

### 6.5.4 What can you be paid for?

The last Ikigai concept is "What can you be paid for?" It refers to securing an income by what you are doing. Operating a firm means keeping track of economically sustainable revenue streams and managing the costs to cover the expenses for resources, insurance, salaries, etc. For that reason, the entrepreneur must find a balance between revenues and costs.

People generally pay for products and services if they benefit the customers and help them solve a specific and relevant problem. However, solving relevant problems may not be enough to establish a viable business model and ensure enough revenues to operate the company. Some issues may be relevant to people, but entrepreneurs can not develop sufficient recurring revenue streams. In financial management, profitability indicates the relationship between costs and revenues. Profitability is defined by the Gartner Online Glossary <sup>10)</sup> as

(...) "a measure of an organization's profit relative to its expenses. Organizations that are more efficient will realize more profit as a percentage of its expenses than a less-efficient organization, which must spend more to generate the same profit."

A profit is a difference between a business's revenue and expenses directly related to revenue generation. The Ikigai question "What you can be paid for?" is operationalized with the construct "Anticipated Profitability". Respondents and nascent entrepreneurs need to anticipate the potential profitability of the business idea (developed in class) before deciding to exploit the business opportunity. It is therefore hypothesized that higher anticipated profitability of the business idea has a direct and significant impact on the attractiveness of the business idea and its realization.

*H2: The higher the anticipated profitability, the higher the perceived desirability of the business idea.*

### Anticipated Profitability

In this study, the Ikigai guiding question "What you can be paid for?" is represented by the construct "Anticipated profitability". Anticipated profitability of a business idea is defined as the positive or negative assessment of the expected long-term profitability and the potential to increase profitability through efficiency gains and/or additional revenue streams. The items are presented in figure 6.19.

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<sup>10)</sup><https://www.gartner.com/en/finance/glossary/profitability>. Retrieved: 20.08.2021

**Items on: Anticipated Profitability**

With respect to your specific offering, please rate the following questions from 1 (very low) to 7 (very high)

ID	Item
AP01	Estimate the anticipated long-term profitability.
AP02	Estimate the anticipated potential to increase the profitability over time through efficiency gains.
AP03	Estimate the anticipated potential to increase the profitability through additional revenue streams.

[1 = Very low; 2 = fairly low; 3 = somewhat low; 4 = undecided; 5 = somewhat high; 6 = fairly high; 7 = very high]

Figure 6.19: Items on: Anticipated Profitability

## Supporting Constructs

### Clarity about your Business Idea

In this study, respondents assess the constructs of the underlying theoretical model. As a foundation and object of assessment, the business idea constitutes the critical pillar of the study. Therefore, respondents must clearly understand the underlying business idea before assessing the constructs of the model and responding to the questions.

The main subject of assessment is the attitude towards the business idea. For that reason, clarity about the business idea is the first and initial construct and the beginning of the reflective process. Moreover, the business idea serves as an anchor and a mediator variable against which the following constructs are evaluated. Clarity about the business idea refers to the degree of knowledge the participant has about the potential future business. A business idea can be characterized by a detailed description of the offering (product or service), the potential customers, the underlying customers' problems to be solved, and a unique value proposition. Inspired by the user need, a statement that is used by the Design Thinking methodology and by the company positioning statement Blank and Dorf (2020), the following business idea statement (BI00) is presented to the respondents to ensure the clarity of the underlying business idea. The items on the clarity of the business idea are presented in figure 6.20 and 6.21.

Depending on the context of the survey, it can serve as an initial question to be filled out or, in case the business idea is defined and presented externally, this form can serve as the clarification and brief business idea description. Primarily, the form can detect diverging

**Items on: Clarity about the business idea 1/2**

BI00 (Optional): Please fill out the following form to describe your business idea:

For (customer segment) \_\_\_\_\_

Who have to (job statement) \_\_\_\_\_

And want to (desired outcome) \_\_\_\_\_

We offer (product/service) \_\_\_\_\_

Which is (product category) \_\_\_\_\_

That provides (key benefits) \_\_\_\_\_

Figure 6.20: Items on: Clarity about the business idea 1/2

viewpoints in team evaluation and create a shared understanding of the business vision. Since a business idea developed in class can still be vague and sketchy, the following parts of a business model are addressed: Product description, value proposition, problem statement, and customer segments. Therefore, "Clarity about the business idea" is defined as the individual's knowledge about the product or service to be developed, the potential target customers, the problems to be solved, and the value proposition. In addition, the ability to describe the business idea in words to a friend or partner is another appropriate indicator of the clarity of the underlying business idea.

**Items on: Clarity about the business idea 2/2**

Referring to the underlying business idea, please indicate your level of agreement with the following statements from 1 (total disagreement) to 7 (total agreement).

ID	Item
BI01	I know which product or service I want to develop
BI02	I know the potential customers for the offering
BI03	I know the problems I want to solve with the offering
BI04	I know the value proposition of the product or service
BI05	I can easily describe the business idea to a friend or partner

[1 = strongly disagree; 2 = disagree; 3 = somewhat disagree; 4 = undecided; 5 = somewhat agree; 6 = agree; 7 = strongly agree]

Figure 6.21: Items on: Clarity about the business idea 2/2

### **Perceived Core Competences - Business Idea Fit**

As presented in section 2.5.1, the constructs perceived behavioural control and self-efficacy Bandura (1982) share similarities and use comparable items for measurement (see Ajzen (2002) for a compilation of items on both constructs). In general, both constructs refer to the perceived confidence in their ability to successfully perform specific tasks or actions.

Based on Ajzen's definition of PCB presented in section 2.5.1, PBC can be considered in the context of the study as people's perceived capability to realize the business idea. The concept is therefore also related to the "Perceived Feasibility" of (Shapero and Sokol, 1982). Interestingly, PBC connects to the concept used in the educational and pedagogical field: competence. Based on their extensive review, Tittel and Terzidis (2020, p. 19) define competence as "the disposition to generate adequate actions to responsibly solve problems in variable situations." In accordance with the Recommendation of the European Parliament and the Council of 18 December 2006 on key competencies for lifelong learning EU (2006) and the Education Resources Information Center of the US Department of Education (ERIC)<sup>11</sup>, competence is based on knowledge, skills, and attitudes. A closer look at the items used to measure the PBC by Liñán and Chen (2009) reveals a close relationship to the competence concept by including the knowledge and attitude dimension as well as referring to a specific competence itself (to control the creation process of a new firm): "I know the necessary practical details to start a firm" (knowledge); "I know how to develop an entrepreneurial project" (knowledge); "I can control the creation process of a new firm" (competence); "I am prepared to start a viable firm" (attitude). For that reason, it seems appropriate to address whether the respondents believe they have the right competences to realize the business idea successfully. Since the items address the competence dimensions, they need not be re-developed. Instead, a light modification for the given study context will be adequate. The construct "Perceived Core Competences - Business Idea Fit" is defined as a person's positive or negative assessment to possess the knowledge, skills and attitudes needed to realize the business idea.

In light of the discussion mentioned above, it is hypothesized that if the respondent believes to have the right competences needed to successfully realize the business idea (Core Competences- Business Idea Fit), it will positively affect the attitude towards the business idea.

*H3: The higher the perceived fit between the core competences and the business idea, the higher the desirability of the business idea.*

With clarity about their own core competences, the respondents can assess the level of fit between their core competences and the business idea. It can be assumed that a greater

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<sup>11</sup><https://eric.ed.gov/?qt=competence&ti=Competence>

perceived core competence - business idea score increases the attitude towards the business idea. This idea seems familiar with the established construct of "perceived feasibility".

With respect to the definitions of Perceived Feasibility derived in section 2.5.2, the construct is defined as the degree to which a person feels capable of realizing his or her business idea. As shown by Liñán (2005) and Ajzen (2002), the construct is similar to self-efficacy and perceived behavioural control. After the review of the construction and formulation of items for self-efficacy and perceived behavioural control presented in table B.3, items were selected from the perceived behavioural control scale used by Liñán and Chen (2009, 2006). The items were adapted to the context of the study by formulating condition sentences. To indicate the reflective relationship between one's competences and the perceived feasibility of the business idea, the original item: "I can control the creation process of a new firm", was modified to: "With my core competences, I can control the realization process of my business idea". Other items were adopted with the same background. The items to measure the perceived fit between the core competences and the business idea are presented in figure 6.22.

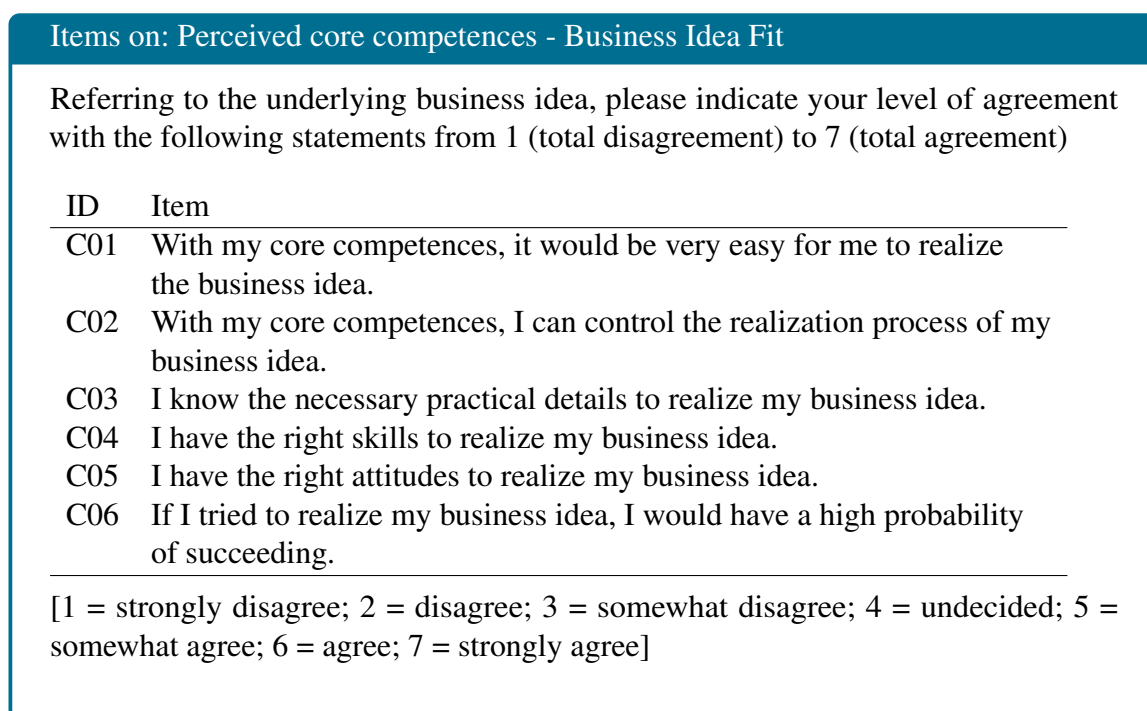


Figure 6.22: Items on Perceived core competences - Business idea fit

### **Perceived Personal Values - Business Idea Fit**

According to the theoretical model, a greater fit between personal values and the underlying business idea positively affects the attitude towards the business idea. Based on a self-

assessment, the questions presented below are used to measure the level of the fit between personal values and the underlying business idea. The construct "Perceived Personal Values - Business Idea Fit" is defined as a person's positive or negative assessment of possessing the personal values needed to realize the business idea. The items are presented in figure 6.23.

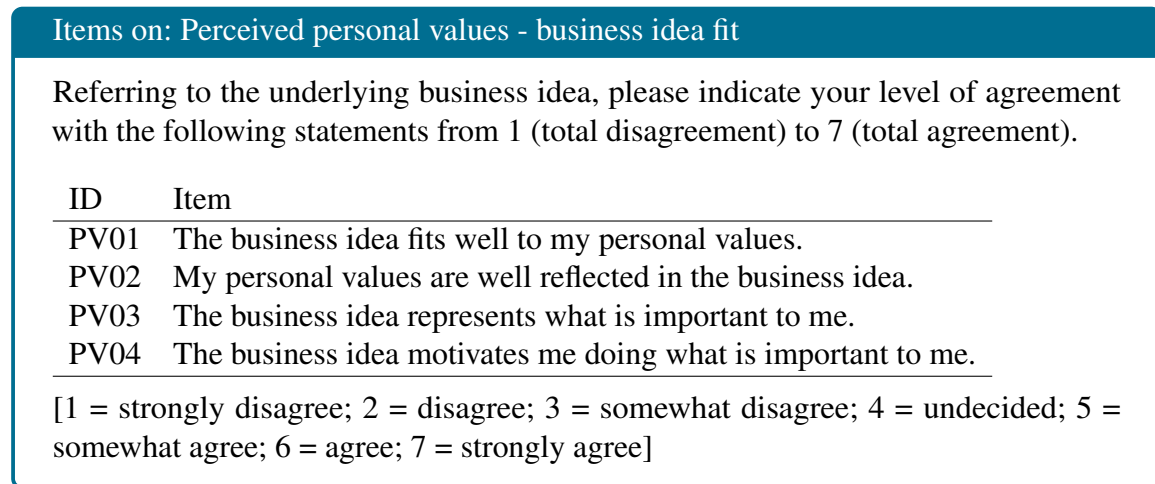


Figure 6.23: Items on: Perceived personal values - business idea fit

It is therefore hypothesised that

*H4*: The higher the perceived fit between the personal values and the business idea, the higher the desirability of the business idea.

### Measuring Attitudes Towards the Business Idea

Ajzen (1991, p. 188) defines an attitude towards a behaviour as "the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question". Analogous to the definition of attitude towards the behaviour, the attitude towards an object or a concept (business idea) can be defined as a person's favourable or unfavourable evaluation or appraisal of the object in question. In other words, "an attitude is a bi-polar evaluative judgement of the object. It is essentially a subjective judgement that one likes or dislikes the object, that it is good or bad, that he feels favourable or unfavourable toward it." (Otway and Fishbein, 1976, p. 2). A profound overview of the measurement of attitudes is provided by Lovelace and Brickman (2013). According to the authors, the three most common items used in attitude inventories or scales are dichotomous, semantic-differential, and Likert-type. Each of these three types differs in the number and types of response options. Dichotomous items contain just two response options, while semantic-differential and Likert-type items are polytomous. An example of the three types is presented in fig 6.24

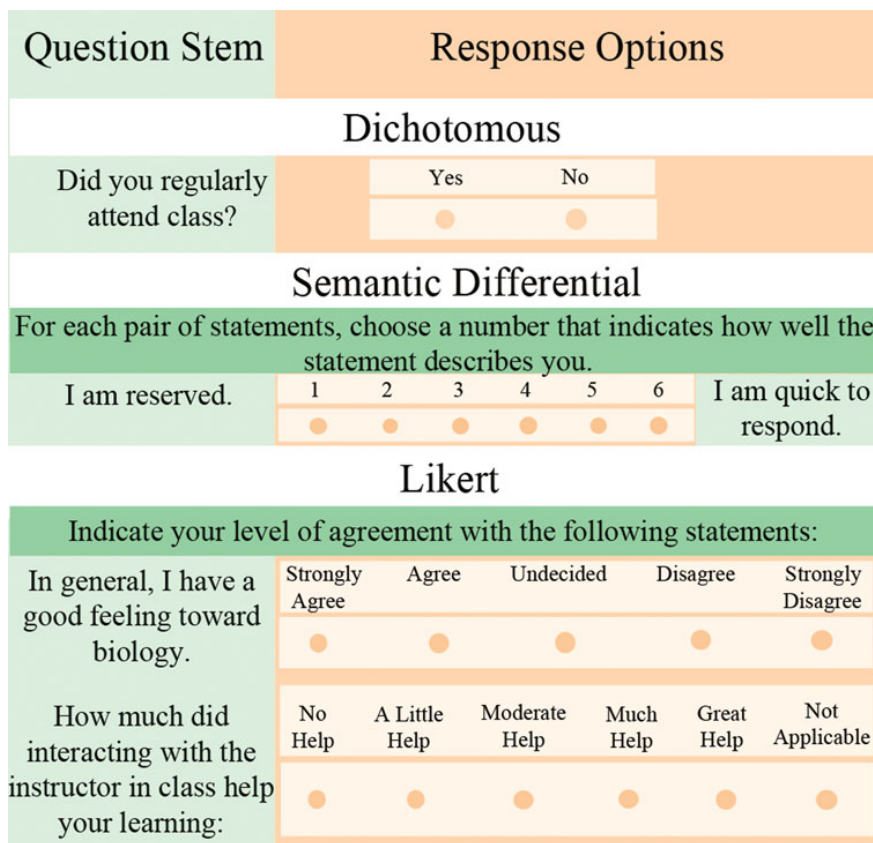


Figure 6.24: Example of most common types of items used to measure attitudes. Source: Lovelace and Brickman (2013, p. 609)

The semantic differential technique was introduced by Osgood et al. (1957) and asks a person to rate an object, issue, event or topic (subject of evaluation) on a standard set of bipolar adjectives (i.e. with opposite meanings). The semantic differential is widely used in advertising and marketing research, from questionnaires to interviews and focus groups. The versatility of uses with the bipolar adjectives and the simplicity of understanding them have made it ideal for consumer questionnaires and interviews.

With respect to the definitions of Perceived Desirability compiled in section 2.5.2, the construct in this study refers to the question of how desirable is the underlying business idea for the future entrepreneur and how desirable it would be to realize the idea. It is therefore defined as the degree of perceived personal desire (attitude) to realize the underlying business idea. The questions are adapted from the personal attitude scale by Liñán and Chen (2009) and transformed into conditional sentences to reflect the potential future behaviour under specific external circumstances. In addition, the first question was adapted from Shook and Bratianu (2010). The items are presented in figure 6.25.



Items on: Attitudes towards the Business Idea		
Referring to the underlying business idea, please rate the following statements from -3 on the negative side to +3 on the positive side:		
	For me, the business idea is	
Not attractive	-----	Attractive
Undesirable	-----	Desirable
Not promising	-----	Promising
Meaningless	-----	Meaningful
Boring	-----	Inspiring
Shortsighted	-----	Visionary

Figure 6.25: Items on: Attitudes towards the Business Idea

### **Intention to realize your Business Idea**

As discussed and presented in chapter 2, an agreed definition of entrepreneurial intention among scholars does not exist. However, in most cases, the concept refers to a conscious goal to become an entrepreneur and start a new venture. The context of the current study requires a light modification of the construct. The items on entrepreneurial intentions as defined by Liñán and Chen (2009) measure the intention of participants to start their venture.

The organizational and social context in academic entrepreneurship education courses, however, is a facilitating and can be a hindering factor at the same time for the development of entrepreneurial intentions. On the one hand, lecturers and trainers create appropriate pedagogical settings within the organizational and institutional frameworks to develop entrepreneurial competencies and a positive learning experience that aims to support the intention to start a venture in the future. On the other hand, pedagogical interventions are created for students who attend courses and lectures as part of their study plans and programs. As a result, students can not directly exploit the business opportunity identified in the seminar and realize their business idea. The main concern is completing exams and team projects to get their degree. Against this background, entrepreneurial intention models seem inappropriate in the specific educational context to apply and measure students' entrepreneurial intentions.

The intentions and plans of students to create their startups right after entrepreneurship courses have been the subject of investigations in the recent Global University Entrepreneurial Students' Spirit (GUESS) Survey by Kailer et al. (2019). Interestingly, the study shows that five years after graduation, self-employment becomes more important for all fields of study, compared to career paths in established companies. The GUESS

report presents that directly after graduation, 63% of the respondents (N = 1.999) intend to start their career as an employee (39% in a SME and 24% in a large company). Five years after graduation and with more professional experience gained on the job, 29% of students responded to intend to found their own company. Despite the fact that students intend to start their entrepreneurial career five years after graduation, it is important to note that the GUESS survey uses common and standard entrepreneurial intention items by (Liñán and Chen, 2009). The items measure students' current degree of intention to become an entrepreneur ("I am ready to make anything to be an entrepreneur") within their study programs. Consequently, the questions applied in undergraduate or early Masters' courses do not measure the intention to realize their business idea developed in class in five years or after gaining relevant professional experience in an established company.

In this context, there is considerable potential that the students will not immediately intend to realize their business ideas and start a new venture after the course. Expected values of honest, reflected and realistic responses to the original items, such as: "I am ready to do anything to be an entrepreneur", "I will make every effort to start and run my own firm", or "I have very seriously thought of starting a firm" (Liñán and Chen, 2009) are to be relatively low or not valid. In most cases, during their bachelor's and master's studies, students are mainly concerned with their courses, lectures, exams, and team assignments to pass their examinations successfully. Therefore, developing and having a firm intention to start a venture based on the business idea seems quite unrealistic. For that reason, the original items on entrepreneurial intentions have their limits concerning the context of the study.

A slightly different approach in a similar field has been taken by Kolvereid (1996). In his study, Kolvereid applies the Theory of Planned Behavior (Ajzen, 1991) to predict the employment choice intentions of students. On a 7-point scale, Kolvereid uses the following items to measure the occupational status choice intentions:

- "If you were to choose between running your own business and being employed by someone, what would you prefer?"  
(1 = Would prefer to be employed by someone to 7 = Would prefer to be self-employed);
- "How likely is it that you will pursue a career as self-employed?"  
(1=unlikely to 7=likely)
- "How likely is it that you will pursue a career as employed in an organisation?"  
(1 = unlikely to 7 = likely)

In this case, participants indicate the likelihood of choosing a career as self-employed versus the likelihood of pursuing a career as an employee in an established organization.

That types of questions address the future and hypothetical choice of a career path of the respondent. The business ideas and plans developed in the pedagogical settings should trigger the student's intention to realize the business idea. However, it is more likely that the work on their projects addresses the overall attitude towards entrepreneurship and starting their venture in the next years than realizing the business ideas right after the class during their studies. The items for the construct "Perceived Desirability of the Business Idea" are presented in figure 6.26. The items are a slight modification of the Perceived Desirability item using the "I would love doing it" formulation by Krueger (1993). In addition, the items refer to the future perspective and include a modification of the professional attraction item from Liñán and Chen (2006): Being an entrepreneur would entail great satisfactions for me.

#### Items on: Perceived Desirability of the Business Idea

Referring to the underlying business idea, please indicate your level of agreement with the following statements from 1 (total disagreement) to 7 (total agreement)

ID	Item
PD01	After my studies, I would love to realize this business idea.
PD02	If I had the right team, I would love to realize this business idea.
PD03	If I could take a semester off, I would love to realize this business idea.
PD04	If I had a substantial funding, I would love to realize this business idea.
PD05	Realizing the business idea would entail great satisfactions for me.
PD06	After my studies, I would love to apply for the EXIST Business Startup Grant to realize my business idea <sup>a</sup> .

[1 = strongly disagree; 2 = disagree; 3 = somewhat disagree; 4 = undecided; 5 = somewhat agree; 6 = agree; 7 = strongly agree]

<sup>a</sup>The EXIST Business Startup Grant is a German funding program that supports innovative business Startups from universities and research institutions in the early stages.

Figure 6.26: Items on: Perceived Desirability of the Business Idea

The evaluation of the constructs and processing of the questionnaire will be performed by participants attending the workshops or taking part in the dedicated experiment. The questionnaire will be an evaluation tool to measure the output variable of the model. Consequently, the items should refer to the respondent's perceived and self-assessed evaluation of the constructs and their sub-constructs. The assessment is a reflexive relationship between the respondent and the constructs.

<b>Ikigai</b>	<b>Operationalization</b>
What do you love?	Clarity about personal values
What are you good at?	Clarity about core competences
What the world needs?	Perceived market attractiveness
What you can be paid for?	Anticipated profitability
<b>Entrepreneur-Opportunity Nexus</b>	
	Perceived personal values- business idea fit
	Perceived core competences- business idea fit
	Perceived social norms- business idea fit (optional)
<b>Additional and supporting constructs</b>	
	Access to key resources (optional)
	Clarity about the business idea
	Attitudes towards the business idea
	Perceived impact of the business idea (optional)

Table 6.7: Definition of constructs (object level)

## 6.6 Scale Evaluation and Refinement

The formulated items should be subjected to a pretest with a smaller group of respondents before the actual main study. Based on the pretest results, if necessary, the items should be adjusted or refined, and unsuitable items should be eliminated. As part of the pretest, the overall quality and suitability of the measurement models must also be subjected to an initial check (Weiber and Mühlhaus, 2014). After defining constructs and the generation of their representing items, the items need to be evaluated to ensure content validity (MacKenzie et al., 2011). The authors present two definitions of content validity referring to Straub et al. (2004) and Kerlinger (1966). According to Straub et al. (2004, p. 424) content validity is "the degree to which items in an instrument reflect the content universe to which the instrument will be generalized". Kerlinger (1966, p. 459) defines the term as "the 'representativeness' or 'sampling adequacy' of the content—the substance, the matter, the topics of a measuring instrument". "Content validity refers to the adequacy with which a measure assesses the domain of interest" (Hinkin, 1995, p. 968). Therefore, content validity requires three critical conditions: a) evidence of content relevance, b) representativeness and c) technical quality assessed by experts and target group representatives (Boateng et al., 2018).

To define and assess the content validity of items and scales, the raters need to have a "sufficient intellectual ability" MacKenzie et al. (2011, p. 306) to understand the context, the constructs and their theoretical definitions. For that reason, research assistants, familiar

with the constructs, research agenda and teaching formats, were chosen as experts (N = 5) to discuss, reflect and validate the questionnaire in two iteration rounds addressing two content validity dimensions: I) clarity of the questions and II) their relevance for the domain. In addition, KIT students (N = 7) were included in the validation process by assessing each item for clarity and relevance. An online survey was developed to assess the content validity of items and capture the following scale suggested by Zamanzadeh et al. (2015); Lynn (1986): 1= item not relevant or clear; 2= need some revision; 3= relevant but need minor revision; 4= very relevant or clear. The respondents assessed each item, commenting on ambiguous or unrelated items (see the evaluation tool in fig. 6.27. Complete questionnaire can be found in B). In addition to the individual assessment, the participants were interviewed about their perception of the questions. Their comments were captured, analysed and included in the overall item evaluation process in the second iteration. In the second iteration, some items were modified, dropped or new items were created according to the discussions and new insights from experts, students, and the literature.<sup>12</sup>

## Clarity about Personal Values

**Values are trans-situational goals, varying in importance, that serve as guiding principles in the life of a person or group.**

Please rate the item using the following scale:

1= not relevant or clear; 2= need some revision; 3= relevant but need minor revision; 4= very relevant or clear

6. I know my most important personal values				
	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Your comments				
<input type="text"/>				

Figure 6.27: Evaluation Tool for Content Validity (excerpt)

<sup>12</sup>Please note: The scale for market attractiveness was developed, discussed and assessed with students and experts during the pre-test phase of the questionnaire and after the formal scale evaluation process. Thus, the results and feedbacks could not be formally documented in the scale development and refinement table in the appendix. The positive results of the discussions are documented in the zoom meeting recordings.

### 6.6.1 Content Validity

The validity of an instrument ensures that the assessment instrument is measuring what it intends to measure. Based on the individual assessment of the items, a quantitative measure can be calculated to determine the quality of the items. Three common forms of validity exist: content, construct, and criterion validity. Content validity (CV) is the pre-condition to ensure the construct validity (Shrotryia and Dhanda, 2019). Content validity shows the extent to which an empirical measurement reflects a specific domain of content (Carmines and Zeller, 1979). According to Haynes et al. (1995, p. 238), content validity is "the degree to which elements of the measurement instrument are relevant, representative, and comprehensive of the construct for a particular assessment purpose". Therefore, indexes of CV were developed according to Polit and Beck (2006).

It is recommended to involve a minimum of three experts in determining the content validity (Lynn, 1986). The assessment of content validity of the items generated and derived from the literature was iteratively performed with the integration of five domain experts. Then the questionnaire was implemented as an online tool and was presented in two iterations to the expert group focusing on the clarity and relevance of the questions. The results of the first iteration of content validation are presented in the appendix.

Additionally, using a subset of study participants, five Bachelor's and Master's students from related entrepreneurship courses at the KIT were included in the content validation process. Both qualitative (content interviewing) and quantitative (rating scale) feedback on the clarity was collected from the student group throughout the second iteration of the content validation addressing the clarity of the questions to ensure a clear understanding of questions by the target group.

In the second iteration, modifications to grammar, word choice, answer options and constructs were made based on the feedback from the cognitive interviews and in-depth discussions with experts with an economic and psychology background. Thus, the conceptualization and operationalization of the Ikigai framework were refined and improved for consistency and clarity.

Content Validity Index (CVI) and Kappa statistic were calculated for content validity assessment. To determine the content validity of both items (I-CVI) and scales (S-CVI), the Content Validity Index is used as a common and accepted measure (Lynn, 1986; Shrotryia and Dhanda, 2019; Zamanzadeh et al., 2015). According to Zamanzadeh et al. (2015); Lynn (1986), the I-CVI is the number of experts giving a rating of 4 or 3 (very relevant or relevant but need minor revision) to the *relevancy* of each item, divided by the total number of experts.

In their work, Polit and Beck (2006) extensively reflect on the Content Validity Index. The authors approve and recommend following the quality standards for valid items and

scales developed by Lynn (1986). with "five or fewer experts, all must agree on the content validity for their rating to be considered a reasonable representation of the universe of possible ratings" (Lynn, 1986, p. 383). Following her consideration, the I-CVI should be 1.00 when five or fewer experts assess the content validity of the items. With five domain experts involved in the first iteration process, this measure applies to our study. Tables 3-10 present the CVI of the first iteration on item level. Items with a I-CVI lower than 1.00 were revised, modified or removed from the scale in the second iteration.

A second measure introduced by Polit and Beck (2006) is the S-CVI. It represents the content validity of the overall scale and can be conceptualized as Universal agreement (S-CVI (UA)) or S-CVI (Average). S-CVI (UA) represents the proportion of items on an instrument that achieved a relevance rating of 3 or 4 by all the experts in the panel. To reflect content validity on scale level, Lynn (1986) recommends having an S-CVI measure >0.8. The S-CVI was computed as Universal Agreement (UA) in the first iteration process. As a result, the S-CVI (UA) was 0.74, indicating a relatively low validity on the scale level and great potential for improvement in the second iteration.

## 6.6.2 Inter-rater Reliability

Well-designed research studies must include procedures that measure agreement among the various data collectors since multiple people collecting and assessing data may experience and interpret the phenomena of interest differently (McHugh, 2012). To complement the CVI, inter-rater reliability is computed to eliminate the possibility of chance agreement. Inter-rater reliability is "the extent of agreement among data collectors" (McHugh, 2012, p. 276). To test interrater reliability, a number of statistics have been used and established over time. McHugh (2012, p. 277) presents a partial list of standard statistical methods: Cohen's kappa (for two raters), the Fleiss kappa (adaptation of Cohen's kappa for 3 or more raters), the contingency coefficient, the Pearson r and the Spearman Rho, the intra-class correlation coefficient, the concordance correlation coefficient, and Krippendorff's alpha (useful when there are multiple raters and multiple possible ratings). For the purpose of this study, the Kappa statistics calculation performed by Shrotryia and Dhanda (2019); Zamanzadeh et al. (2015) was applied. First, the probability of chance agreement ( $P_c$ ) was computed using the following formula:

$$P_c = \frac{N!}{A! \cdot (N-A)!} \cdot 0,5^N$$

In this formula, N = number of experts in the panel, A = number of experts in the panel who agree that the item is relevant/clear. Kappa statistic is then calculated as:

$$K = \frac{(I - CVI - Pc)}{(1 - Pc)}$$

Landis and Koch (1977) have proposed the following as standards for strength of agreement for the kappa coefficient:  $\leq 0$ : poor; 0.01–0.20: slight; 0.21–0.40: fair; 0.41–0.60: moderate; 0.61–0.80: substantial; and 0.81–1.0: almost perfect. The first iteration of the content validation resulted in a modified Kappa value in the range of 0.59 (moderate)- 1.0 (almost perfect). In the study, five experts were included in the content validity assessment process (multiple raters) using a 4 point scale (multiple possible ratings) for relevance and clarity. For that reason, the Krippendorff’s alpha was chosen for determining the interrater reliability.

### 6.6.3 Internal Consistency

Chronbach’s Alpha ( $\alpha$ ) is a measure widely used to assess the internal consistency of a scale (Cronbach, 1951). The  $\alpha$  value ranges between 0 and 1, with higher values indicating that the survey or questionnaire is more reliable. Table 6.8 presents the  $\alpha$  value for the scales computed in R. The assessment of the scales is based on the recommendations by Cronbach (1951). The scale  $\alpha$  values vary between acceptable and excellent. Please note that since the constructs MA and C0 are formative constructs "internal consistency is not required, desired or expected for instruments containing formative indicators" (Gruijters et al., 2021, p. 9).

ID	Scale	Number of items	Cronbach’s $\alpha$	Assessment
VB	Personal Values - Business Idea Fit	4	0.92	Excellent
CB	Competence - Business Idea Fit	5	0.86	Good
MA	Market Attractiveness	5	–	–
AP	Anticipated Profitability	3	0.70	Acceptable
DBI	Desirability of the Business Idea	6	0.92	Excellent
V0	Clarity about the Personal Values	3	0.74	Acceptable
C0	Clarity about the Core Competences	4	–	–
BI	Clarity about the Business Idea	5	0.94	Excellent

Table 6.8: Internal Consistency: Cronbach’s Alpha

In addition to the analysis of the items presented above, items and constructs will be critically assessed within the evaluation of the Structural Equation Model in chapter 6.9.4.



*"All models are wrong, but some are useful".*

(George Box)

## 6.7 Developing an Opportunity Recognition Workshop

As presented and discussed in chapter 2, opportunity recognition is a central aspect of entrepreneurship. In many universities worldwide, Entrepreneurship Education is an essential part of the national strategy to train and educate people to become entrepreneurs, establish venture companies and foster economic innovation potential and economic growth. EE aims to develop students' entrepreneurial competencies, to enable students to identify business opportunities, create business models, and write business plans. Based on initial ideas, students participate in business planning courses and pitch their ideas to educators, peers, experts, and potential investors. Authors agree that the identification and selection of opportunities are, among others, the most important competences of successful entrepreneurs Ardichvili et al. (2003); Stevenson et al. (1989). A practical, scientifically sound, and effective opportunity recognition process enables entrepreneurs, entrepreneurial teams, and students to identify, select and evaluate business ideas and opportunities, reduce risks, and increase the motivation and success of opportunity execution.

For the development and design of the opportunity recognition workshop as a final pedagogical intervention, the main concepts of Ikigai and state of art in opportunity recognition and entrepreneurship were used. An established Instructional Design Model (see fig. 3.2 in section 3) was used to define and follow critical steps and processes in the pedagogical configuration of the intervention. In the following sections, the necessary steps of the Design Science as an overarching research approach (see fig. 3.1) and the pedagogy-specific activities of the Instructional Design (see fig. 3.2) are implemented.

### 6.7.1 Problem Explication and Need Definition

For the development and design of the opportunity recognition workshop, instructional goals must be identified, and the context and the target group must be analyzed. Thus, the main challenges in entrepreneurship education courses and specific needs must be captured.

The main objective of Entrepreneurship Education (EE) is to develop some specific level of entrepreneurial competence (Lackeus, 2015). The heterogeneity in EE programs, their target groups, teaching methods, and evaluation strategies makes it challenging to compile and compare the overall objectives of EE. However, practise-oriented entrepreneurship courses often include the development of business ideas, the preparation of a business plan and the development of an investor pitch. In this case, the business idea serves as a starting

point for teamwork and the future learning experience, which is supported by the following statement by Bhawe (1994, p. 224):

*"Venture creation is the process that roughly begins with the idea for a business (...)"*.

In theory and practice, it is a verifiable fact that the characteristics of the business ideas developed in class affect the motivation and involvement of the team members and the students' overall learning experiences and outcomes. Three scenarios can be observed in such entrepreneurship classes: First, students enrol and start the course without a specific business idea. Second, students enrol in the class having a rough or a particular idea in mind that they want to validate and develop within the course. Usually, those business ideas derive from the personal and social experiences of the students. Third, in challenge-based classes, students must find innovative solutions to specific use cases or case studies presented by an external company or a startup. In the first case, develop a business idea in the course's first 10-15 minutes. As a result, students often focus on problems and challenges from their personal experience and social context. Examples of such business ideas are the pizza delivery app, the automated bicycle lock or the bar and club discount app. These business ideas often do not have a viable business case.

Case two, however, often reveals more specific business ideas based on industry insights from internships or a deep engagement with a particular topic of the students. Examples are solutions to industry problems gained during internships in a car manufacturer (recycling batteries produced for electric cars). Nevertheless, those cases are unfortunately rare. In addition, students do not have access to critical resources and do not have the in-depth industry knowledge and background experience to realize business ideas. Authors agree that several factors play a significant role in opportunity recognition. Two of them are prior knowledge/business experience and social/professional networks (Grégoire et al., 2010; Short et al., 2010; Filser et al., 2020). Students in their early twenties can not have much professional experience with in-depth market or industry know-how and an extensive professional network.

As a course outcome and the result of the third case, students present in-depth market analysis and potential business solutions for products or services or perform a customer segmentation for existing companies or Startups. However, in such a course setting, the motivation to follow up on projects or internships in the startups to deepen the activities is rare. However, case three has excellent potential for developing a sustainable business idea. The idea provider has already done much of the conceptual and analytical work. Depending on the formulated challenge, students can find other product applications, develop future scenarios, and identify different customer groups by market segmentation. However, the initial idea is already given and does not necessarily meet the students' interests.

Based on experience and practical evidence of over 30 entrepreneurship courses in the last seven years at the KIT, it can be stated that the quality of students' business ideas and opportunities in the scenario I and II often do not fulfil one or more of the basic criteria for successful innovation such as technical feasibility, customer desirability, business viability and novelty. An already developed business idea (scenario III) may have great business potential. Nevertheless, it does not necessarily lead to the students' motivation, perseverance and creativity. Moreover, the integration of external business ideas owned by companies or individuals can lead to some friction if the question of IP developed in class is not agreed with the idea provider. As a result, the motivation and commitment of the teams decrease during the semester, which is shown by the following quotes from course evaluations:

*"I would have wished for a greater focus on idea generation, especially at the beginning"* (Entrepreneurship Basics WS 2017/18)

*"Idea generation is somewhat unstructured. The quality of the ideas is therefore rather poor. Better: systematic exploration in certain industries"* (Entrepreneurship Basics SS 2018)

*"It was hard to stay focused and motivated knowing that the idea was not promising"* (Der Weg zum eigenen Unternehmen. HOC. SS2019)

Thus, the explicit underlying problem is that students' business ideas developed in entrepreneurship courses at the KIT are often not perceived as desirable by the course participants. Thus, they do not inspire and motivate students to realize their business ideas after finishing the courses. Instead, undesirable and not encouraging business ideas demotivate students and harm their course performance and learning experience.

## 6.7.2 Definition of the Context Requirements

The definition of requirements needs to be considered from different perspectives:

- Organization and administration (e.g., course duration, specifications and the number of the target group),
- Education and pedagogy (e.g., constructive alignment), and
- Practicability and transferability (e.g., trainers and educators in different organizations should be able to conduct the workshop successfully).

### **Organizational Requirements and Framework Conditions**

According to Johannesson and Perjons (2014, p. 103) "a requirement is a property of an artefact that is deemed as desirable by stakeholders in a practice and that is to be used for guiding the design and development of the artefact. A requirement can concern the functions, structure, or environment of an artefact as well as the effects of using the artefact."

The first definition of requirements for a practice-oriented opportunity recognition workshop addresses the organizational framework conditions at the KIT. Entrepreneurship education programs for Bachelor's and Master's students are mainly offered by the Institute for Entrepreneurship, Technology Management and Innovation (EnTechnon) at the KIT. Until Winter Semester 2021/22, both Master's and Bachelor's programs had a similar organizational structure, content and duration. In a 2.5-day format, students started with an initial rough business idea, developed a customer profile (persona) on day one, filled out the business model canvas on day two and pitched their business idea on day 3 to a jury, peers and trainers. Therefore, the opportunity recognition workshop has clear time restrictions and needs to fit into the 2.5 days format. Within this framework, a one-day format is feasible for implementing the opportunity recognition and business idea development phase.

The opportunity recognition workshop potentially addresses different target groups: Master's and Bachelor's students, entrepreneurs, innovation managers, and their product development teams. However, the workshop will be developed to be conducted and validated at the EnTechnon entrepreneurship courses at the KIT.

Most students applying to entrepreneurship courses at EnTechnon are from the industrial engineering study program. It is a noticeable fact that both Master's and Bachelor's students often do not have an in-depth understanding of the concepts, tools and frameworks of entrepreneurship. The expectations mentioned by the course participants often reveal that the introduction of critical frameworks, methods and approaches to find and evaluate a viable business idea is desired. In addition, topics such as finance, sales and the main steps in an entrepreneurial journey are mentioned. However, as part of the Entrepreneurship Module in their Master's study, participants also visit the entrepreneurship lecture, which provides the theoretical background, key concepts of entrepreneurship, anecdotal insights, and practical experience from guest speakers and entrepreneurs. For that reason, many Masters's students are already familiar with key concepts of entrepreneurship and want to apply the theoretical knowledge in a practice-oriented setting.

In its latest iteration, the workshop was part of the newly developed 6 ECTS entrepreneurship course for Master's students, "Startup X", in the winter term 2021/22. Startup X includes six building blocks, so-called districts: Opportunity District, Problem District, Solution District, Market District, Company District, and Communication District. The opportunity recognition workshop initiates the startup journey in a one-day workshop. It is the

starting point in the students' entrepreneurial journey. It provides a structured approach to identifying relevant problems, developing a list of business ideas, and selecting potential business opportunities within the course. However, the workshop was also conducted in the Leadership Talent Academy (LTA) in 2021, including Master's students and PhD candidates and the "Entrepreneurship Basics" seminar for Bachelor's students. Although the organizational framework conditions for the seminars are slightly different, the course framework, presentation material and exercises were harmonized as much as possible.

### **Functional Requirements**

The research project aims to develop a scientifically sound and practical opportunity recognition workshop that will be conducted and evaluated in an academic setting at the KIT. The first and key functional requirement is to address and solve the critical challenge and exact problem defined above. Thus the workshop needs to provide activities, frameworks, instructions, and learning and working materials to enable students to develop business ideas which they perceive as desirable and inspiring. In addition, the course framework should be based on action learning and be applicable and transferable to various institutions and situations. After a series of short introductions to the main concepts, methods and tools, the students work in teams of 3-5 students on developing their business projects. To create a profound learning experience, the courses are conducted in an innovative teaching-learning environment provided by the Student Innovation Lab and the Triangel of the KIT. Due to the pandemic, some sessions could not be conducted in person.

For the planning and development of educational courses, the pedagogical quality criteria need to be compiled and considered. They cover the selection and set up of the learning environment (classrooms, arrangement and design of the infrastructure), the lecturer's role, and pedagogical interaction with the students. Selected but standard general functional requirements of pedagogical courses are presented by Gruschka (2007):

- The learning environment is prepared and designed in accordance to the learning objectives
- Learning objectives and course requirements are defined clearly and are realistic
- Mix of teaching methods is implemented
- High proportion of active learning
- Student interests are encouraged
- Lecturers are experts in their field

- Lecturers are well prepared for teaching
- Lecturers are enthusiastic about their subject and motivated to transfer their knowledge
- Lecturers emphasize important parts of their subject during the class
- Teaching methods are used that enable the active collaboration and team work
- Active and self-directed student learning is encouraged
- Lecturers respect individual student differences
- Lecturers ask and are open for feedback
- Lecturers respond to student feedback
- Lecturers show willingness to help
- Learning atmosphere is based on trust and mutual respect
- The examination of students is fair, transparent and reliable
- Books and other sources for individual learning are available
- The subject matter and choice of materials are state of the art
- The course is in accordance with the objectives of the study regulations and vocational preparation
- The arrangement is based on the activation of prior knowledge and the generation of new knowledge
- Sufficient time is reserved for questions and discussion
- The planning includes forms of active learning and indicates how students can learn from each other
- The needs of the students with regard to their study goals have been considered responsibly

### **6.7.3 Definition and Analysis of the Target Group**

In addition to the target group characterization and based on a researched-oriented Design Thinking Project performed in 2016 to find the suitable configuration for a Master+ Program, the following student characteristics were derived from a target group analysis. In that analysis, qualitative interviews were conducted with Master's and Bachelor's students to derive a representative persona for the entrepreneurial courses at the KIT. Based on the insights of the study, three main groups could be defined which are useful for the underlying target group characterization: Students with a latent interest, students with an active interest, and founder students at the KIT. To represent both male and female students in the courses, the male and female persona was developed and presented in the following section.

#### **Students with latent interest**

This group of students is usually interested in entrepreneurship but does not actively participate in relevant events in the region and does not attend the existing entrepreneurship courses or lectures offered at the KIT or other institutions and ecosystems. However, these students are still aware of startups at the university and the region and have several friends and fellow students actively participating in that field. Nevertheless, their characterization is primarily based on the absence of clear and visible activity and involvement in the entrepreneurship context.

#### **Students with active interest**

Students with an active interest are usually heavily involved in the entrepreneurial ecosystem in Karlsruhe. They know the different services and support mechanisms provided at the KIT and the region. Moreover, they are active members of one of the KIT student groups described above. They also want to shape their personal and professional life and actively design their future by taking responsibility and creating impactful solutions for themselves, the planet and society.

#### **Founder students at the KIT**

The KIT has several Bachelor's and Master's students who have already founded their startup companies during their studies. These students clearly understand the subject and possess unique IT or other specialized skills. Due to the double burden, these people face a significant challenge managing their startup activities and finishing their study program at the KIT. The founders also face an extraordinary situation regarding required skills and knowledge: They often need experts and mentors who will support special issues from a long-term perspective, such as taxes, legal conditions, marketing strategy, product development and pricing.

As a result, the male and female persona for Elias and Jasmin (see fig. 6.28 and 6.29) is developed. It represents young (bachelor or master) students who can be characterized as extroverted and intrinsically motivated, friendly and open-minded people with a well-established social network. Jasmin and Elias are or were involved in one of the entrepreneurial student associations (e.g. PionierGarage or EnActus) and strives for self-realization and autonomy. A key characteristic is that Anton wants to "shape his own life" by taking his own decisions and "improve the world with his ideas". Jasmin wants to be engaged in a social project and change the world. However, Jasmin does not have a business idea that inspires, motivates and encourages her to take entrepreneurial actions towards realizing the business idea. They both share the original characteristics and motivation to significantly contribute to searching for solutions to the world's challenges. The opportunity recognition workshop will be developed and designed based on the persona profile for intrinsically motivated students who want to create an impact and solve relevant problems with their business solutions. However, in the case of the opportunity recognition workshop, the target group is not limited to Bachelors and Masters students only. The framework is also beneficial and applicable for PhD candidates.

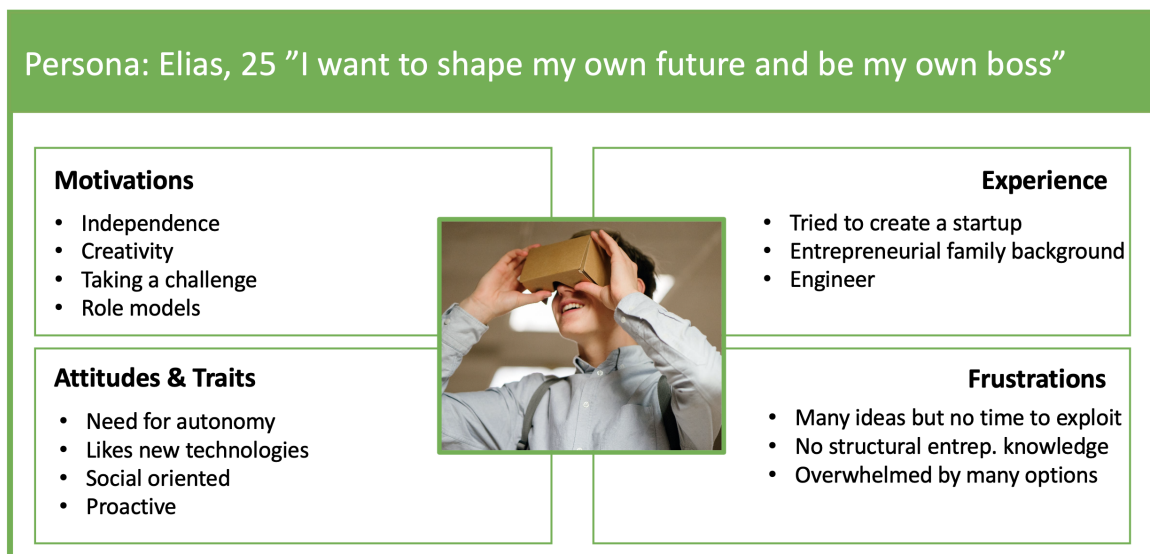


Figure 6.28: Male Persona, Elias

#### 6.7.4 Definition of Performance Objectives

A performance objective (also known as a learning objective) is a description of what the learners will be able to do by the end of the unit of instruction, including the I) Learners' conditions, II) Observed behaviour, and III) Acceptance criteria (see section 2.3.1 for a detailed introduction to pedagogical principles). Following the guidelines to formulate and





Figure 6.29: Female Persona, Jasmin

develop learning objectives provided by the Human Resources Development and Vocational Training department at the KIT (PEBA, 2013), the workshop's learning objectives are formulated as follows: "After completing the opportunity recognition workshop, the course participants will be able to:

- Reflect on and define their personal and team core values using the value finder
- Reflect on and define their personal and team competences using the insights from a 360-degree feedback
- Define their field of interest for opportunity recognition using the UN SDGs and the opportunity recognition board in Mural
- Recall the critical research-based success factors in opportunity recognition presented in class
- Analyze a specific domain of interest using online sources (search engines and industry reports) and interview techniques
- Develop desirable business ideas and evaluate them according to evaluation criteria presented in class
- Define their selected business idea in one focal statement."

## Instructional Strategy and Material

To meet the functional requirements concerning providing an appropriate and clear learning environment for students, key information, learning material and instructions were provided on a document management platform, ILIAS, at the KIT. ILIAS provides key tools for sharing and organizing information with the course participants and providing course documents (key literature, workshop slides, instructions etc.) During the workshop development, the ILIAS environment was re-configured to structurally provide essential information to the course participants (see 6.31). Critical sections were defined and developed to provide the latest information on the following topics: Code of conduct, general course information, learning objectives (see above), teaching-learning format and requirements, and grading and assessment criteria for the deliverables.

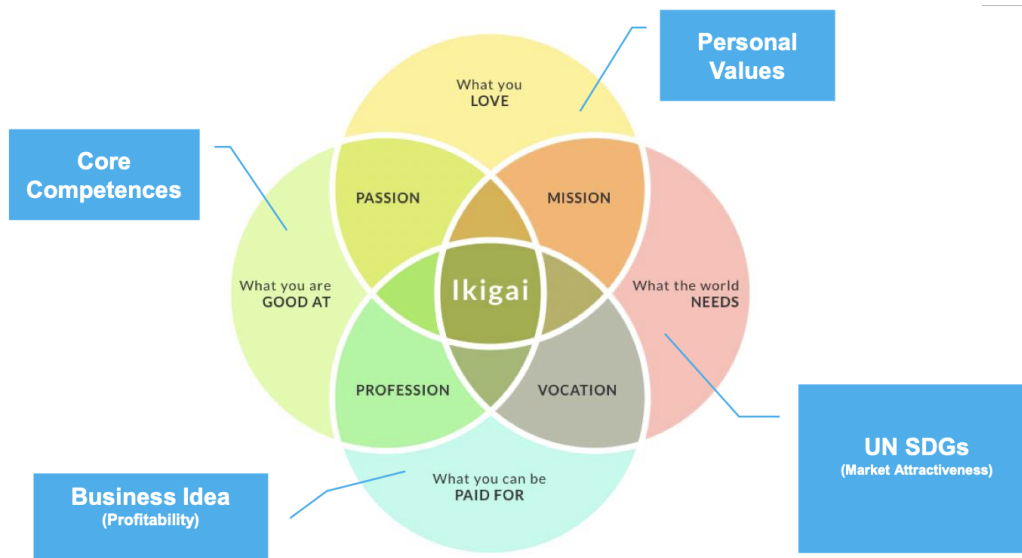


Figure 6.30: Operationalization of Ikigai for Course Implementation

### Code of conduct

Within this course, we introduce this Code of Conduct and explicitly expect course participants to follow the following principles:

- Act and communicate concerning course participants and trainers
- Follow the content and instructions introduced in class carefully
- Be present during online classes- physically and mentally
- Support team members and course participants

Dear Students,

**a warm welcome to the online course Teamproject: Opportunity Recognition for a Sustainable Business Model!**

To ensure a smooth seminar process and create a great learning experience, please read the following information carefully. We hope it will be an exciting and a productive semester for all of us and we are here to help you and answer your questions.



**Alexander Tittel**  
alexander.tittel@kit.edu



**Benedict Hebllich**  
benedict.hebllich@kit.edu

- ▶ OUR CODE OF CONDUCT
- ▼ GENERAL COURSE INFORMATION
  - ▶ IMPORTANT DATES
  - ▶ GENERAL COURSE PROCEDURE
  - ▶ LEARNING OUTCOMES
  - ▶ TEACHING AND LEARNING FORMAT
  - ▶ GRADING AND DELIVERABLES
- ▶ COURSE AND ONLINE TOOLS MANAGEMENT STRATEGY

Figure 6.31: Course information on ILIAS

- Use differences as opportunities- learn from each other
- Challenge each other to become better
- Be open to learn

### General course information

- Important dates: Seminar dates and deadlines for deliverables
- Theoretical Background: Synchronous knowledge transfer: Please consider the presentation and the videos as the main source of the theoretical background. They will give you the main information you will need to solve the tasks given in the course.

- Application of knowledge and theory: In this course, you will work in teams of 3-5 people. You will form teams and develop ideas and business models based on your competence and value profile. Consider teamwork also as learning by doing framework. That's the reality of real startup projects.
- Reflection and Feedback: At this stage, you have got a theoretical introduction to the specific topic, worked on your tasks and challenges, and made your experience during the learning process. In class, you will now have the possibility to discuss the process and results, reflect on the learning experience, share your thoughts, and give feedback to your peers.

### **Teaching - learning format and requirements**

Action Learning is applied to create a rich learning experience in this course. Action Learning facilitates effective learning at deeper levels by actively engaging students in the process.

- Listen: Impulse
- Do: Activity & experience
- Reflect: what, how, why, how else
- Internalize: Theorize & practice

The following competences are required from course participants to deal with the given challenges successfully:

- Deal with unstructured information
- Solve problems under uncertainty
- Communicate, cooperate and collaborate
- Organize tasks and make appropriate decisions
- Take initiative

The following character traits are required from course participants to deal with the given challenges successfully:

- Extraversion
- Proactivity
- Need for achievement
- Innovativeness

### **Grading and assessment criteria for the deliverables**

Since the opportunity recognition workshop is the first part (day one) which will be included in different seminars in the same format, the assessment criteria presented below includes additional topics in day two and three, as well as the grading and assessment criteria for the complete seminar.

- **Business Plan:** Please use the EXIST Business Plan template in the template folder for the Business Plan preparation. Scope: 7000 words. The following assessment criteria are applied:
  - The document has a clear sound structure
  - Expression and spelling are correct
  - Scientific preparation of the work (references, quotations...) is flawless
  - Visual elements are chosen appropriately
  - Documentation and traceability of data acquisition, analysis and evaluation are sufficiently given
  - Content is developed according to the course instructions
  
- **Video Pitch:** Please create a 10 minutes video pitch including the following content:
  - Introduction/Purpose
  - Problem
  - Solution
  - Business Model
  - Technology/USP
  - Market Size
  - Competition
  - Management Team
  - Financial Projections
  - Current Status and next steps

The following evaluation criteria are applied:

- Layout and form of presentation are chosen appropriately
- Presentation is well prepared using an appropriate amount of visual elements

- Data is well-researched and organized visually
- Story Line is sound and clear
- Story Line is convincing for the target group
- The Video Pitch is prepared with creativity

### **6.7.5 Teaching Strategy and Learning Arrangement**

The opportunity recognition workshop is organized in six building blocks, including the following topics. To anchor the information, insights, experience and knowledge provided during the sessions, each of the topics includes reflection and feedback from lecturers, mentors, and peer students:

1. Welcome and course overview
2. Introduction to Entrepreneurship
3. Personal and Team Core Competences
4. Personal and Team Core Values
5. Definition of the Problem Space by analyzing the UN SDGs
6. Definition of the Solution Space by ideating, selecting and evaluating business ideas.

The workshop is developed based on the Ikigai framework presented above. The Ikigai operationalization and the general framework are shown in figures 6.30 and 6.32. A detailed workshop description is presented in table 6.9.

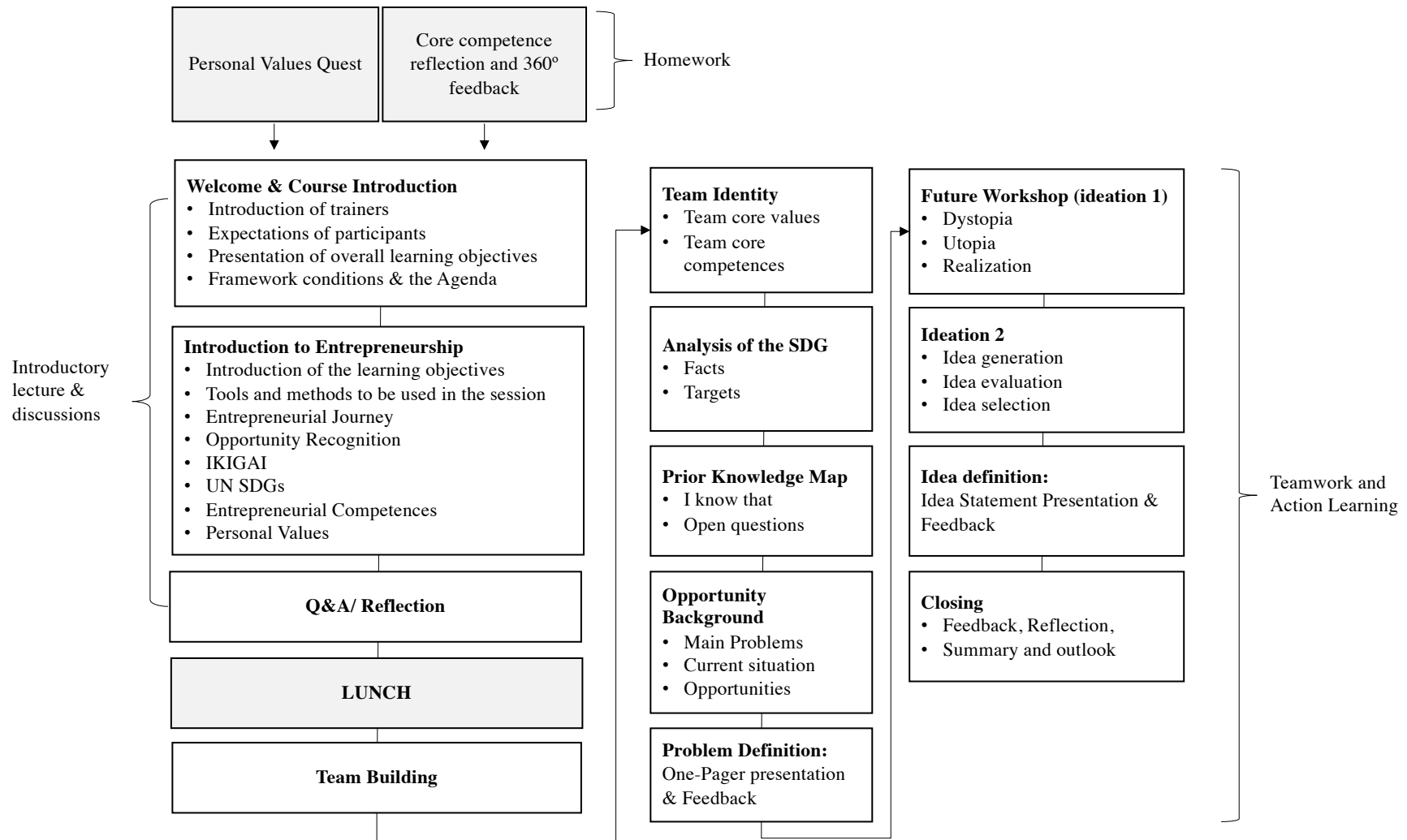


Figure 6.32: Opportunity Recognition: Detailed Course Configuration

Table 6.9 – continued from previous page

Step	Activity/Topics	Objective of intervention	Outcome
Present and explain the learning objectives	Introduce and explain the learning objectives to the class by explaining the expectations from the lecturer's perspective. <b>Duration:</b> 3-5 min. <b>Material:</b> PPT slides.	Introduce the learning objectives and your expectations to the class. Refer to the expectations mentioned by the course participants. Inform students about expected learning outcomes to be achieved after they successfully participate in the class.	Students are informed about the trainers' expectations, the potential scope of the course, main topics and key terms.
Present and explain the teaching and learning format	Explain the role of action and experience-based learning approaches in entrepreneurship and the course context. <b>Duration:</b> 3-5 min.	Explain the learning and teaching style applied in the class and prepare students to work iteratively in teams.	Students are informed about their role, the role of the lecturers, the mode of interaction within the class, the teamwork environment and the requirements of iterative learning progress.
Introduce the working templates in Mural (see the template in fig. H.1).	Open Mural board online and give a brief overview of the working templates on Opportunity Recognition and Opportunity Exploitation. <b>Duration:</b> 3 min. <b>Material:</b> Laptop, Video Projector, Mural boards.	Inform students about the templates and their role in the team collaboration process.	Students are informed about the templates, the working sequence, course structure, access to Mural boards and the Mural platform in general.

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## Introduction

Step	Activity/Topics	Objective of intervention	Outcome
Welcome the participants	Open the course by welcoming student participants and introducing the trainers, mentors and staff involved. Give an overview of the course context and explain participation, submission criteria, and requirements for ECTS recognition. <b>Duration:</b> 5 min. <b>Material:</b> PPT slides.	Officially start the session, make the students feel comfortable, and create a trustful learning and teaching environment.	Students are familiar with course requirements, and teaching staff and are informed about enrollment criteria.
Obtain expectations	Ask participants for their course expectations (topics of interest, insights, tools and methods, open questions) and note the expectations on a whiteboard or a PowerPoint slide. <b>Duration:</b> 10-30 min. <b>Material:</b> PPT or white board.	Get informed about issues that participants are interested in and align course expectations with course content. Define what is inside and outside the scope of the course. Give a chance for each participant to talk and create a trustful environment.	Students are informed about the scope of the course and know what other course participants care about.

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Table 6.9 – continued from previous page

Step	Activity/Topics	Objective of intervention	Outcome
Introduction to entrepreneurship and setting the mindset	Introduce and give an overview of the main steps and challenges in an entrepreneurial journey. Point out the role of Opportunity Recognition for entrepreneurship. <b>Duration:</b> 40 min. <b>Material:</b> PPT slides.	Inform students about critical steps in the entrepreneurial journey, present the main differences between established companies and young ventures, and present common definitions of startups.	Students are informed about key terms, the role of Opportunity Recognition in entrepreneurship, working conditions and limited resources, and the main motivations of entrepreneurs to start their own companies.
Introduce opportunity recognition	Present key definitions of opportunity recognition and the relevance of opportunity recognition for entrepreneurship. Introduce state-of-the-art and critical factors affecting the opportunity recognition capabilities of entrepreneurs. <b>Duration:</b> 15 min. <b>Material:</b> PPT Slides.	Inform students about key terms and introduce their relevance for entrepreneurship and the course. Raise awareness for main factors and initiate reflection about their capabilities and resources needed for opportunity recognition. Create relevance for the target group, present state of the art, activate prior knowledge and cognition, and sensitize students to problems, challenges and opportunities	Students are informed about critical terms, their definitions and their main components. Moreover, they know the role and connection of the entrepreneur, the technology and the environment in the course context and entrepreneurship. Course participants can reflect on the resources needed for a successful opportunity recognition process.

*Continued on next page*

Table 6.9 – continued from previous page

Step	Activity/Topics	Objective of intervention	Outcome
Introduce and present the UN Sustainable development Goals (SDGs)	Introduce the origin and the background of the SDGs. Present a video for further details and discuss selected goals and topics with the participants. <b>Duration:</b> 20 min. <b>Material:</b> PPT, YouTube video on the SDGs.	Inform students about critical global problems and challenges. Initiate reflection on their previous knowledge about the problems and their origin. Initiate resonance between the participant and the topics.	Students are informed about the UN SDGs and their meaning for policy and society. Participants are sensitized about critical social and environmental challenges and can reflect on their specific societal roles.
Introduce the difference between entrepreneurship and management activities	Explain and discuss the main activities critical for entrepreneurship and refer to entrepreneurial competences. <b>Duration:</b> 20 min. <b>Material:</b> PPT.	Raise awareness about key entrepreneurial activities, mindset and the underlying motivation of entrepreneurs to start their own business.	Students know the main difference between entrepreneurial and managerial activities. Course participants know some entrepreneurial competencies needed for action in the early startup phase.

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Table 6.9 – continued from previous page

Step	Activity/Topics	Objective of intervention	Outcome
Introduce entrepreneurial competences.	en- Present definitions of competence and entrepreneurial competence. Introduce state of the art referring to the competence framework developed by Tittel and Terzidis (2020) and point out the opportunity recognition as one of the key entrepreneurial competence. Present the competence radar developed in the qualitative study in section 5. Refer to the Ikigai framework and connect the competence topic to the "What are you good at" section. Refer to the core competences template and the 360-degree feedback. <b>Duration:</b> 15 min. <b>Material:</b> PPT slides, Entrepreneurship Competence article, Core competences template.	Inform students about the theoretical foundation of the competence concept by introducing the definitions and the key components of competence. Inform about state of the art and present a list of critical entrepreneurial competences needed for entrepreneurial action. Raise awareness and enable personal reflection on students' competences, skills and attitudes towards entrepreneurship.	Students can characterize the terms competence and entrepreneurial competences and name examples for each category. Students are aware of their knowledge, skills and attitudes relevant to entrepreneurial activities.

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Table 6.9 – *continued from previous page*

<b>Step</b>	<b>Activity/Topics</b>	<b>Objective of intervention</b>	<b>Outcome</b>
Introduce core personal values.	Refer to the Ikigai framework and point out the relation between the "What do I love" guiding question to the personal values construct. Introduce main psychological theories (Self-Determination Theory) and the theoretical background to personal values by Schwartz (1992). Refer to the personal value quest and explain different evaluations of the personal value template. <b>Duration:</b> 30 min. <b>Resources:</b> PPT slides, personal value quest.	Inform students about the core concepts and definitions of personal values. Explain the relevance of considering personal and team core values in an entrepreneurial process. Allow students to ask questions about their personal value template. Sensitize their values and initiate the reflection process.	Students know their values according to their personal values template. Participants know the relevance of personal values for entrepreneurship and potential effects on team work, goal setting and personal work and life satisfaction.

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Table 6.9 – *continued from previous page*

<b>Step</b>	<b>Activity/Topics</b>	<b>Objective of intervention</b>	<b>Outcome</b>
Team Formation	Based on personal preferences (field of interest, prior knowledge, education background, and personal/professional experience), participants form teams of 4-5 people. <b>Instruction:</b> <i>Please read the technology descriptions and organize yourself in teams of 5 people around one technology!</i>	Cognitive and physical activation, Create Team identity, Create commitment to the topic and team members	Teams are formed, Technologies are chosen, Participants are activated.

Table 6.9: Didactic Course Outline

After introducing the main concepts, theoretical background and the course setting, course participants build teams of 3-5 students based on their interests and personal values by choosing one of the 16 goals. In an online setting, an online team formation sheet is presented to the course participants to indicate their names for the specific topic. On-site seminars allow the distribution of printed tiles with the SDGs' name in the seminar room. Students can move from one topic to another, talking with fellow students about the SDG's potential content and aligning the information with their interests. As a result, students with similar interests and values create an initial team.

### **Step 1: Creating Team Identity**

Creating a solid team identity is a critical step in team formation and has a positive effect on team performance Schippers (2017); Steger et al. (2012); Mathieu et al. (2017). In this context, team participants need to define what is important to them on a personal level (personal values) and which challenges and activities they can successfully achieve (core competences). Based on that, as a team, participants must find a shared understanding of their motivation and capabilities by defining and agreeing on team values and core competencies.

**Taxonomy levels involved:** Remember, understand, apply, (analyze)

#### **Defining Team Core Values**

After the initial team formation, the teams start working on their online Mural boards to guide them through a structural opportunity recognition process. Beginning with the team core values, the students get to know their teammates by discussing the following guiding questions and sharing their personal experiences with the team:

- What was your most exciting vacation in the last few years?
- Why did you choose this specific activity/location?
- What are your most important personal values according to the personal value profile, and what do you think about them?

Based on that, the team reflects on and discusses their values and agrees on 3-5 shared values relevant to the team. The list of shared values is captured on the mural board section: Team core Values.

#### **Defining Team Core Competences**

Next, the individual core competences are presented and discussed to form a team core competence profile using the three main categories (personal, social, and domain) previously

introduced in the competence framework. The team lists their core competences related to entrepreneurship but includes knowledge, skills, and attitudes that might not be associated with entrepreneurial action at first glance. The goal is to use the reflection and insights from the 360-degree feedback and become aware of one own capability. The list of core team competences is captured on the mural board section: Team core competences. **Taxonomy levels involved:** Remember, understand, apply, (analyze)

## Step 2: Definition of the Problem Space

The following analytical steps follow convergent and divergent thinking patterns applied in the Design Thinking Approach. Understanding the SDGs is often challenging at first glance. The goals are formulated generically (Zero Hunger, Quality Education etc.). Therefore, creating a cognitive and analytic procedure is crucial to define and analyze the underlying information and the cause-and-effect relationship. In addition, a common understanding among the team members of the underlying challenge needs to be developed. The following two steps initialize a communication and analysis process. The next task initializes this process: "Please choose and describe your SDG in your own words. Use the fact sheet and the info graphic of the specific goal to find a common understanding and define your focus. Next, choose targets that seem interesting to you."

### 2.1 Facts

In that section, the team collects all critical and relevant facts available on the UN SDG fact sheet or other online sources to create a solid knowledge base and a shared understanding of the Goal and its challenges.

### 2.2 Targets

The website of the United Nations includes defined targets and indicators for the goals. A list of targets is provided and serves as a shared vision towards a better future. In this step, students use the information and choose relevant targets from that list to create the first vision of a potential common goal and understand the generic sub-goals of the SDGs. **Taxonomy levels involved:** Remember, understand, apply, analyze, evaluate

## Step 3: Activating Prior Knowledge

As described above, prior knowledge is one of the key factors in opportunity recognition. It includes work experience, specific industry insights, or prior startup experience. Therefore, it is vital to activate students' prior knowledge about the specific domain and work out



blind spots for further analysis. The Prior Knowledge section includes two parts: "I know that" (current knowledge base) and "Our open questions" as an indication of required future information.

### **3.1 I know that...**

Team participants share their information and knowledge about the underlying problems and challenges in this step. Sources for that can be newspaper articles, documentaries, discussions, work-related experience etc. This communication about their knowledge creates a common understanding of the underlying problem. In addition, team members can learn from their team about facts they did not know.

### **3.1 Our open questions**

In that section, the team can and should include open questions they might discover while discussing the facts, problems, causes and effects related to the SDG. **Taxonomy levels involved:** Remember, (understand).

## **Step 4: Opportunity Background and Context**

Next, the opportunity background needs to be defined. The following instruction is given in step number 5: "Please distill the key problems from the descriptions above that you want to focus on. Choose relevant categories to characterize the background and roots of the problems. You should be able to describe the main characteristics and find key facts of the opportunity background". Therefore, the main guiding question is: What is/are the underlying problem(s) that causes the situation described by the Sustainable Goal? **Taxonomy levels involved:** Remember, understand, apply, analyze, evaluate.

## **Step 5: Current situation in your Country/City**

After defining fundamental problems and challenges related to the Development Goals, course participants should reflect on the situation at their current location. They can choose to perform the analysis at the city or country level. With that measure, students become aware of the current situation in their home town or country, realizing that problems mentioned by the SDGs also affect people in their surroundings. **Taxonomy levels involved:** Remember, understand, apply, analyze, evaluate.

## Step 6: Opportunities for Shared Values

Step number 7 includes the analysis of and reflection on already developed business opportunities by consulting companies. The SDG Industry Matrix<sup>13</sup> showcases industry-specific examples and ideas for corporate action related to the SDGs. Resources for different industries are available on the websites: Financial services, Food, Beverage & Consumer Goods, Climate Extract, Healthcare & Life Sciences, Industrial Manufacturing, Transportation, Energy, Natural Resources, and Chemicals. Students can choose one of the options presented in the sources and elaborate more on the opportunity. Moreover, the insights can serve as inspiration for business ideas. **Taxonomy levels involved:** Understand, analyze, evaluate.

## Step 7: Problem specification and presentation

After an in-depth analysis and lively discussions, the teams must compile the information on a one-pager to present to the class. This activity requires a clear and harmonized understanding of the underlying problems, their causes and their effects. In a two-minute presentation, the teams explain the insights and get feedback and additional information from the trainers and their peers. The following sections need to be filled out and presented to the class:

The problem we want to engage with is: \_\_\_\_\_  
We identified the following roots of the problem: \_\_\_\_\_  
As a result, the following effects on people and planet can be observed: \_\_\_\_\_  
The key facts are: \_\_\_\_\_  
Some illustrations: \_\_\_\_\_

**Taxonomy levels involved:** Remember, understand, apply, analyze, evaluate, (create).

## Step 8: Ideation

A participatory methodology from Future Studies is applied to enhance and foster the business idea-generation process. The "Future Workshop" is a method founded by futurologists Robert Jungk, Rüdiger Lutz and Norbert R. Müllert to stimulate the imagination to develop solutions to social problems with new ideas. It uses a participatory approach and follows a three-step procedure: Criticism phase, Utopia phase, and Realization phase. A future workshop includes various methodological elements: Experimental method for the development of alternative futures; Participation method for problem and decision making as well as for the implementation of projects; Learning method for cooperative work and

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<sup>13</sup><https://www.unglobalcompact.org/library/3111>

holistic thinking; Reflection method for checking the individual position in the process of social development (Jungk and Müllert, 1989; Fuß and Stark, 1991).

1. Criticism phase: In this phase, workshop participants take an opposing point of view, remember all negative experiences in a specific field and present them to each other. Based on the interests of the participants, the given problem is redefined, specified or expanded. The main goal is to find reasons, facts, and arguments to complain as much as possible about a given topic. Acting is allowed and desired in this phase. The "complains" need to be written on sticky notes and captured on brown paper in the specific section.
2. Utopia and fantasy phase: In the next step, the teams take an (over) optimistic point of view. Together they "dream" about a situation where everything is possible, and there are no boundaries and hurdles related to the context (utopia).
3. Realization and strategy phase: Finally, the teams connect the events of the two phases by ideating and developing potential options for realization. In this third phase of the future workshop, the ideas and concepts gained in the utopia phase are put back into the context of everyday life, i.e. a sober critical examination of the utopias is to be undertaken.

**Taxonomy levels involved:** Remember, understand, apply, analyze, evaluate, create.

## **Step 9: Idea evaluation and selection**

Step number 9 is initialized through another ideation and brainstorming phase. Based on the phases and the results of the future workshop, team members can develop a new potential solution to the defined problems using the following instruction: "Please generate ideas how to solve the problems and topics identified in steps 5-7. Choose 5 ideas and evaluate them using the dimensions suggested in the evaluation matrix. Please rate your ideas from -2,-1,0,1,2 and choose 1-3 promising ones. Please highlight the chosen ideas". For the first evaluation of the generated ideas, the following dimension is suggested: Desirability, Feasibility, Team-Idea Fit, Team-Values Fit, and Team-Competence Fit. A total score indicates the ranking of the ideas as the team perceives them.

## **Step 10: Idea Definition**

The last step is to define the selected idea with the following statement:

For (customer segment) \_\_\_\_\_  
Who have to (job statement) \_\_\_\_\_  
And want to (desired outcome) \_\_\_\_\_  
We offer (product/service) \_\_\_\_\_  
Which is (product category) \_\_\_\_\_  
That provides (key benefits) \_\_\_\_\_

The definition of each category addressed by the statement is a final result of the ideation session and presents the business idea identified during the workshop. **Taxonomy levels involved:** Remember, understand, apply, analyze, evaluate, create.

## 6.8 Workshop Evaluation: Pre-Study

The workshop was developed and tested in over 12 courses (iterations) at the KIT. The sample is presented in table 6.10<sup>14</sup>. The workshop and its key components were conducted in different pedagogical settings and framework conditions, including target groups. Also, the content, slides, tools and evaluation methods were developed and re-defined with each course iteration. Starting with an experiential course design that included the personal values and a first version of the core competences block, the evaluation was performed in an open feedback session after the class (HOC WS 2019/20 and BPF SS 2020). Later, the first version of a structured evaluation questionnaire was developed, focusing on pedagogical requirements and the effectiveness of the UN SDGs for problem definition and idea generation. The items were developed based on quality criteria of educational courses provided by Brigitte (2000); Helmke (2014); Gruschka (2007). An initial questionnaire was designed to capture the first impressions of the workshop. The scales and items have not been validated according to the quality and validation criteria by MacKenzie et al. (2005); Weiber and Mühlhaus (2014). However, they give first insights into the course's effectiveness and students' level of satisfaction. All items are rated on a 5-point Likert scale: 1 (I strongly disagree) to 5 (I strongly agree). In addition, course participants could comment on their course impression and the overall learning experience. Table G.1 presents students' comments and qualitative evaluations from different courses.

In the winter term 2019/20, the HOC course initialized the conceptual configuration of the workshop. In that workshop, with a colleague and friend, Benedict Hebllich, the topic "Personal Values" was introduced to the students for the first time. Remarkable results, excellent learning experience and a positive course evaluation, motivated the lecturers to

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<sup>14</sup>LQI = Lehrqualitätsindex; QF = Qualitative Feedback; QV1 = Questionnaire V1; IkigaiQ = Ikigai Questionnaire

continue elaborating the course framework and iteratively improve the educational setting, including insights and exercises from the competence and opportunity recognition domain.

	<b>Course</b>	<b>Type</b>	<b>Evaluation</b>
1	HOC WS 2019/20	Pre-study	LQI + QF
2	BPF SS 2020 TAS	Pre-study	LQI + QF
3	EShip Basics SS 2020	Pre-study	LQI + QV1
4	GRACE SS 2020	Pre-study	LQI + QV1
5	EShip Basics WS 2020/21	Pre-study	LQI + QV1
6	Team Projects OppReg WS 2021/22	Pre-study	QF + QV1
7	HOC WS 2019/20	Pre-study	QF + QV1
8	SIL WS 2020/21	Pre-study	QF + V1
9	StartUp X WS2021/22	Main Study	QF + LQI + IkigaiQ
10	LTA WS 2021/22	Main Study	LQI + IkigaiQ
11	EShip Basics 1 WS2021/22	Main Study	QF + LQI + IkigaiQ
12	EPICUR Entrepreneurial Lab WS2021/22	Main Study	QF + IkigaiQ

Table 6.10: Overview of courses and evolution of the intervention

	<b>N</b>	<b>%</b>
<b>Gender</b>		
Male	33	73,3%
Female	12	26,7%
Other	0	0%
TOTAL	45	100%
<b>Matriculation Status</b>		
Bachelor	33	73,3%
Master	6	13,3%
PhD	6	13,3%
<b>Study</b>		
Wirtschaftsingenieurwesen	33	73,3%
Informatik	2	4,4%
Informationswirtschaft	2	4,4%
Other	8	17,8%
<b>Own Idea before the class</b>		

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Table 6.11 – continued from previous page

	N	%
YES	17	37,8%
NO	28	62,2%
<b>Course</b>		
Entrepreneurship Basics (1) Summer 2020	19	42,2%
Entrepreneurship Basics (1) Winter 2020/21	10	22,2%
Business Planning for Founders Summer 2020	6	13,2%
PRE-GROW 2020	6	13,2%
MBA Fundamentals Hector Winter 2020	4	8,9%

Table 6.11: Overview and Characteristics of the Pre-Study Participants

### 6.8.1 Impressions from Qualitative Feedback

During the course evaluations used for the pre-study, course participants gave their qualitative feedback on the learning experience and the course design, which was used to iterate and improve the course content, its tools and instructions. A compiled feedback list can be found in the appendix in table G.1. In general, course participants liked the structured approach of the workshop, which provided guidance and a step by step instructions to come to a business idea. For some participants, working with the UN SDGs was more appropriate than for others stating that the topics limited their creativity. Some feedback impressions are presented below.

#### What I liked

*"Presentation about the personal and team values as well as the strategic process of developing a business idea"* (Case ID 195; Entrepreneurship Basics (Track 1) Winter 2020/21).

*"Besonders gut hat mir die systematische und interaktive Herangehensweise eine Geschäftsidee zu finden gefallen."* (Case ID 282; Entrepreneurship Basics (Track 1) Winter 2020/21)

*"Die Value und Competence Templates im Einzelnen und als Gruppe, denn man bekommt einen schnellen Überblick, mit wem man zusammenarbeitet und was diese Person kann und was ihre Werte sind".* (Case ID 194; PRE-GROW 2020)".

### **What could be improved**

*"I think the UN SDG limit the creativity of the groups. Based on the description of the specific Goal the groups got a pretty strict direction. Probably doing the opportunity recognition in general and not assigned to a goal the participants would think more open minded about what they want to improve in their direct environment". (Case ID 73; Entrepreneurship Basics Track 1 Summer 2020)*

*"Before going to the group phase, perform a round of discussion with currently relevant problems of our community to create some input, with which the team can go on choosing their UN SDG Goal and business ideas". Case ID 195; PRE-GROW 2020)*

*"More structured approach in evaluating the quality of an opportunity (using more sophisticated and factors for deeper insights Like: Time to development, Market size estimation, competitors, partners, financial viability...)." (Case ID 97; Business Planning for Founders Summer 2020)*

### **6.8.2 Survey on the acceptance and effectiveness of the workshop**

In addition to the qualitative feedback and the standard Teaching Quality Index (LQI) of the KIT, students filled out the first iteration of the questionnaire to capture some general course feedback on the pedagogical setting, clarity of instructions and the appropriateness and acceptance of the main workshop components. Figure 6.34 illustrates the first part of the general evaluation responses aggregated from the courses listed in table 6.12.

The course participants agree that the seminar, focusing on opportunity recognition, including personal values, core competences and the UN SDGs, provides relevant knowledge in entrepreneurship. The teaching methods support active team collaboration, and the online tools (Zoom, Mural, Teams) newly introduced during and due to the pandemic are appropriate to the course context. In addition to that, the involvement and interaction with the team and the lecturer were rated positively. At the beginning of the course, most participants indicated that they did not know how to systematically discover and analyze business opportunities. Although each class started with a reflection on course expectations, some respondents were unsure if the seminar fulfilled their expectations. 12 of 45 respondents (27%) indicate that they are not sure about it, and four respondents (8,8%) (2 from Entrepreneurship Basics Summer 2020 and 2 from Entrepreneurship Basics Winter 2020/21) indicate that the seminar did not fulfil their expectations. Some participants may have had different expectations of the course. Also, it is possible that course participants did not have any specific expectations or were not sure about them beforehand.

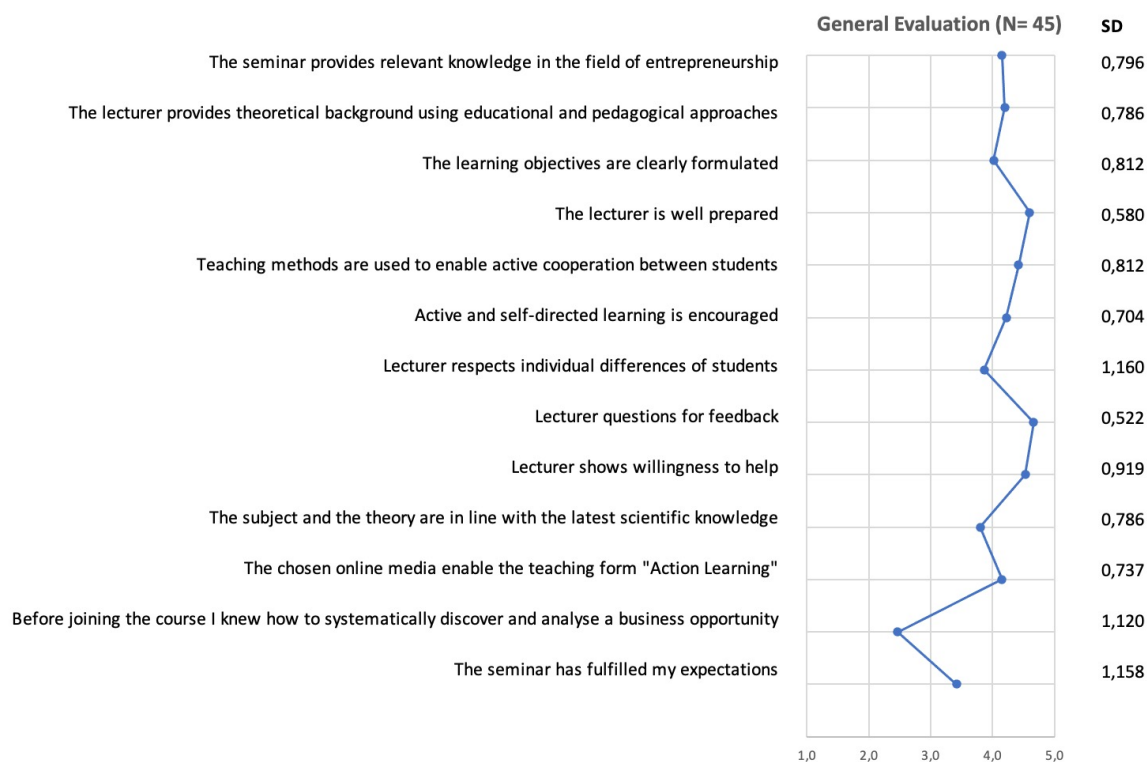


Figure 6.33: Pre-Evaluation of the intervention with focus on the general pedagogical aspects.

The following evaluation block presented in figure 6.34 focused on the business idea developed in class, the overall learning experience, the development of the opportunity recognition competence and indirectly on the intentions to work on the business idea in the future by participating in the GROW startup contest of the PionierGarage).

In general, course participants agree that the course provided a great learning experience, and they like the business idea developed in class. However, working on a business idea after the course is not desirable to many students. A reason could be that most course participants did not plan to participate in the GROW contest. However, 5 of 20 participants (25%) do not agree, and 3 (15% from the course MBA Fundamentals Hector School Winter 2020) strongly disagree that they are motivated to work on the business idea in the future. In total, 40 % of the course participants indicated they were not motivated to pursue the business idea developed in class. However, course participants agree that the unit improved their abilities to develop business ideas.

The final evaluation block was developed to get insights into the course components' acceptance, relevance and major impact. Figure 6.35 presents the results of the pre-evaluation of four different workshops, focusing on personal values, core competences and the SDGs. To better understand and interpret the results, it is crucial to describe the course contexts and students' motivation for participation in more detail. As part of their study program



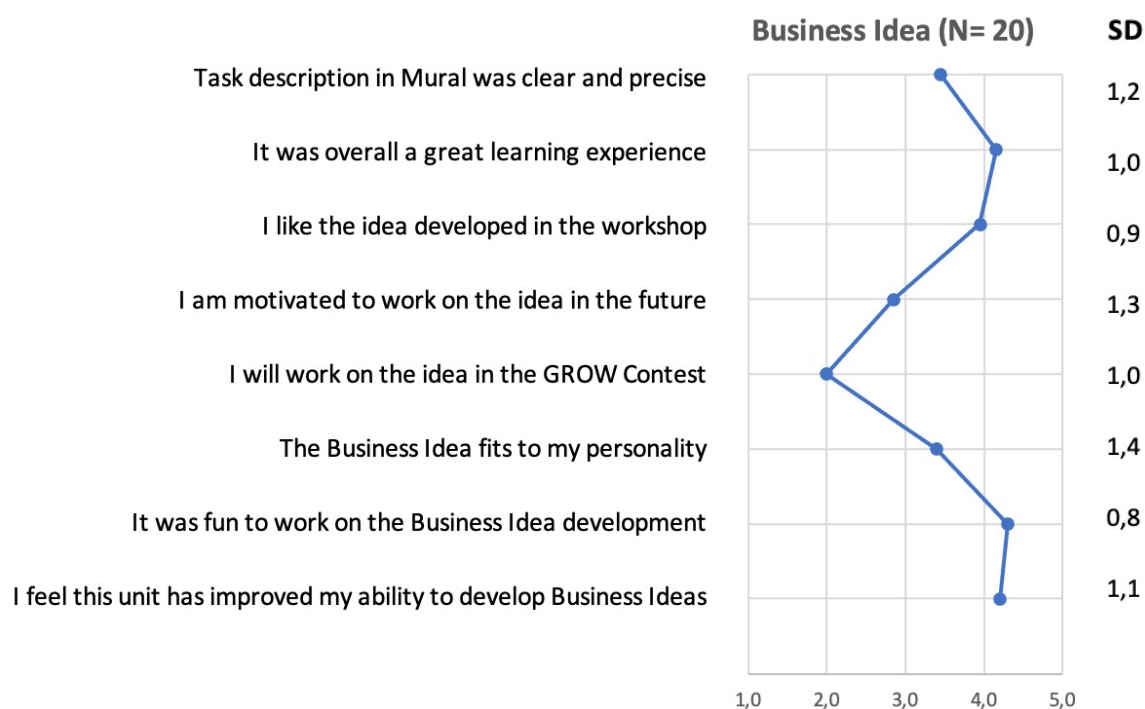


Figure 6.34: Pre-Evaluation of the intervention with focus on the business idea.

and one of the elective courses, the opportunity recognition workshop was conducted with bachelor’s students (Entrepreneurship Basics) in the summer of 2020 and winter term 2020/21. In addition, the opportunity recognition session could be conducted and evaluated in a master course, Business Planning for Founders, in the summer of 2020. All three workshops were included as a part of the curricular entrepreneurship education program offered by EnTechnon. The target groups are Bachelor’s or Master’s students studying industrial engineering at the KIT. The PRE-GROW workshop could be offered as a voluntary extra-curricular workshop for students planning to participate in the GROW Contest and willing to develop a business idea for the contest. The workshop was open to participants from inside and outside the KIT with different study backgrounds.

In this workshop, remarkable and fruitful insights on the course configuration could be gathered from the participants. The structured and organized step-by-step approach was mentioned positively by the participants. Also, the participants appreciated the fact that there is guidance in organizing an exploratory process. The course participants already had a business idea but were open to discovering new opportunities. As a result, they realized how their ideas differed from those developed within the workshop. The newly developed ideas were described as "visionary" and sometimes as "unrealistic" due to their vast impact and complex social and economic structure. This aspect will be elaborated on in more detail in the following sections.

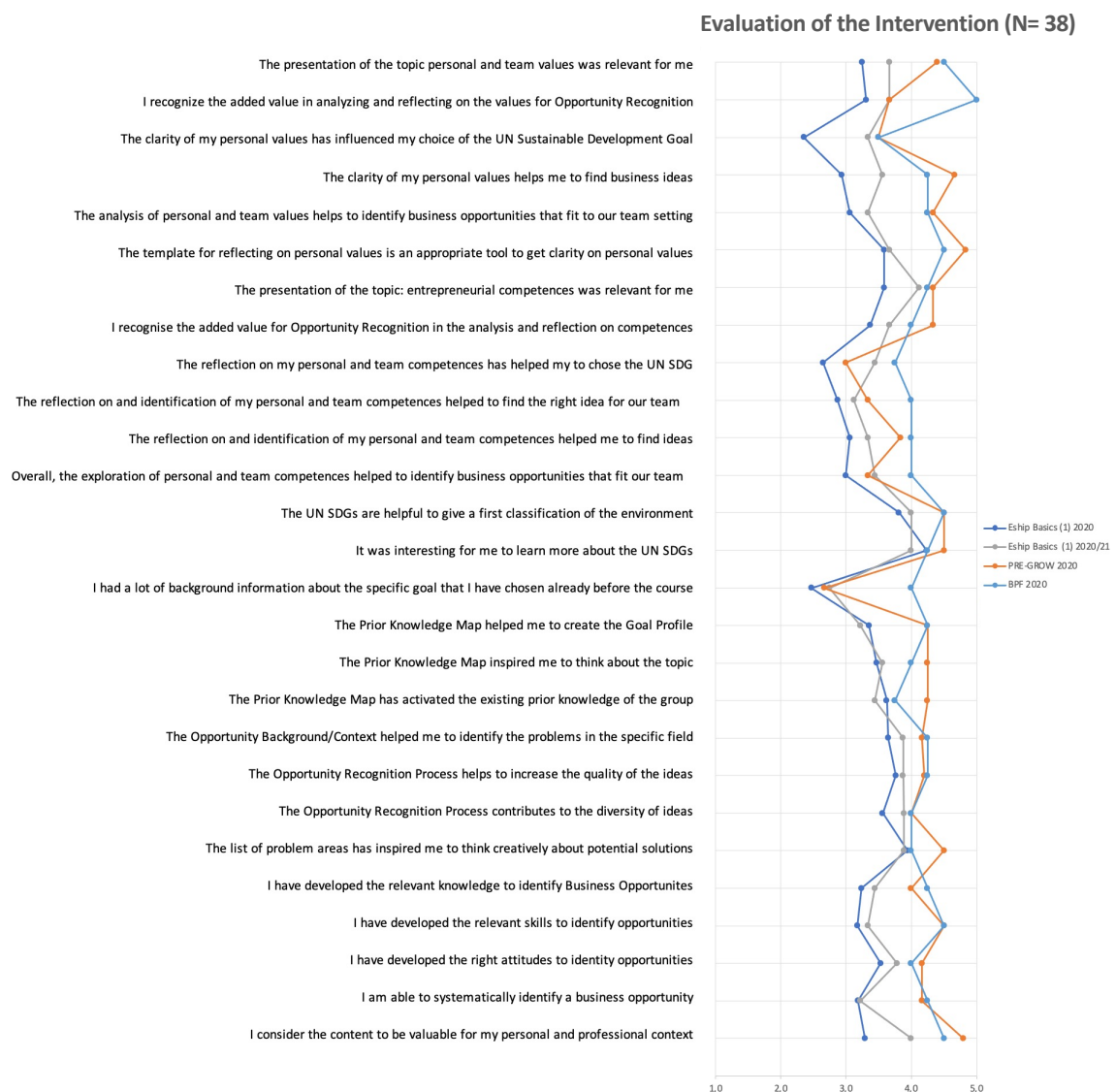


Figure 6.35: Pre-Evaluation of the intervention with focus on the main components.

As a result, figure 6.35 indicates two groups with lower and higher values at most items. A closer look reveals that most of the items were rated lower by bachelor students in their Entrepreneurship Basics courses and higher by master's students in Business Planning for Founders. Interestingly, all six PRE-GROW workshop participants were also bachelor's students. However, their evaluation results are significantly higher than the responses from the Entrepreneurship Basics workshops. For them and master students, the topic of personal and team core values was relevant. That indicates that the selection and identification of the target group play an essential role in the course outcome and learning results. In particular, the relevance of the presented topics for entrepreneurial students is much higher than for students generally interested in the course.

### **Personal Values**

Students from both groups agree that the analysis of and reflection on their personal values and the tools used for identification and reflection help them in their opportunity recognition and business idea development process. Moreover, the analysis of and reflection on their core competences is perceived as relevant and valuable for participants.

### **Core Competences**

More uncertainty and less agreement are indicated in all four groups regarding how the reflection on core competences helps students to choose their problem space (SDGs), to develop business ideas and find the right idea-team fit.

### **UN Sustainable Development Goals**

All participants agree that the UN SDGs are an appropriate source for classifying and characterizing the environment and the problem space. The students did not have a profound background knowledge to characterize the SDGs and therefore perceived the content block presenting the SDGs as enjoyable. However, working with students on the SDGs also revealed some challenges. Due to the general and high-level SDGs, finding and defining one main problem the team is interested in working on is challenging. However, it activates the analytical and reflection processes of the team members. In addition, working with unstructured information and "connecting the dots" at this stage is one of the critical activities in entrepreneurship.

### **Development of the Opportunity Recognition Competence**

In the last section, the course participants rated their development of opportunity recognition competence. The ratings of the two regular Bachelor courses are again lower than the Masters' and the PRE-GROW workshop. Master students and the PRE-GROW participants agree that they have developed the relevant knowledge, skills and attitudes to identify business opportunities. On the other hand, Entrepreneurship Basics students showed less confidence and rated the items on the opportunity recognition competence significantly lower.

As a result, it can be said that the pedagogical intervention was well organized, and the teaching methods and tools were well prepared and suitable for the course context providing a great overall learning experience for course participants. Students also indicate that the workshop has improved their ability to develop business ideas. Moreover, the critical course components (personal values, core competences and the UN SDGs) are perceived as valuable and exciting to many course participants. However, students are unsure how far

the individual topics impact their business opportunity recognition competence. One of the insights derived from the pre-study is the potential difference in the outcomes based on the different target groups and their maturity level. As indicated and presented in figure 6.35, there might be a significant difference between Bachelor's and Master's students and those who are more or less involved in the topic and have a higher relevance.

## 6.9 Workshop Evaluation: Main Study

### 6.9.1 Sample Characterization

Course	N	Response Rate
Entrepreneurship Basics (1) Winter 2021/22 (BA)	17/ 25	68,0 %
Leadership Talent Academy Winter 2021/22 (MA and PhD)	28/ 32	87,5%
Startup X Winter 2021/2 (MA)	17/ 24	70,8 %
EPICUR Entrepreneurial Lab Winter Winter (BA and MA) 2021/2	7/8	87%
<b>TOTAL</b>	<b>69/89</b>	<b>77,5 %</b>

Table 6.12: Overview of the Main Study Participants

In the four courses presented in table 6.10, 69 course participants took part in the main study. However, after cleaning the data set, and eliminating outliers and missing values, the data set includes 66 valid observations. The initial question guiding the data and sample analysis is: How can the sample be characterized regarding their entrepreneurial attitudes? For that, the professional attraction scale by Liñán and Chen (2006) was used in the study to capture how the course participants think about different career options (salaried work, liberal profession, entrepreneur): "In the medium and longer term, considering all advantages and disadvantages (economic, personal, social recognition, labour stability, and so on), indicate your level of attraction towards each of the following professional options from 1 (minimum attraction) to 7 (maximum attraction)". An overview of the professional attraction in the courses is presented in figures 6.36, 6.37, 6.38, 6.39. In this step, only the two extremes (salaried work and entrepreneurship) were compared against each other. According to the responses, only 20% of the Leadership Talent Academy participants indicated entrepreneurship over salaried work. 20% are indifferent, and 60% would prefer salaried work over an entrepreneurial career. The selection criteria for Talent Leadership Academy

differ from the entrepreneurial courses, focusing on social and relationship competences. Therefore, the selected target group can be characterized as not entrepreneurial.

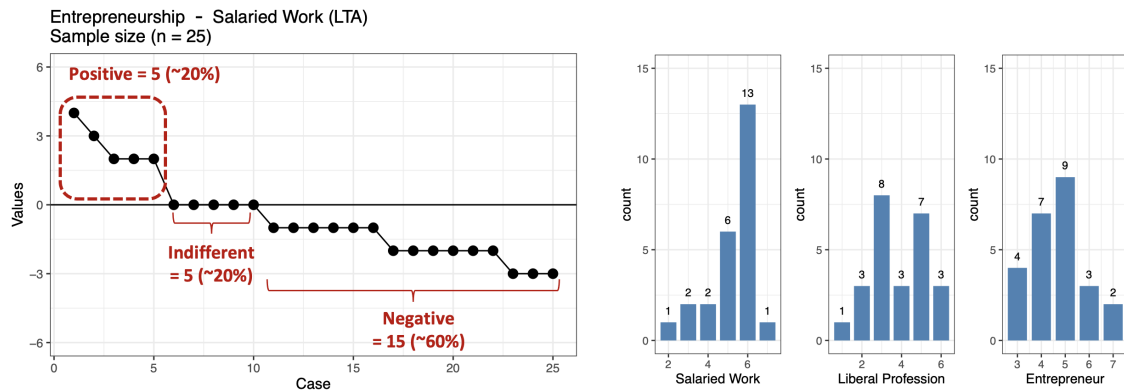


Figure 6.36: Entrepreneurial Orientation. Course: Leadership Talent Academy

On the other hand, the analysis of the course Entrepreneurship Basics reveals that 41% of the Bachelor students would prefer entrepreneurship over salaried work. 35% would do the opposite, and four participants (23%) are indifferent. However, the bar chart also shows that nine students indicated a high (6) attraction to salaried work and seven students are more attracted towards entrepreneurship.

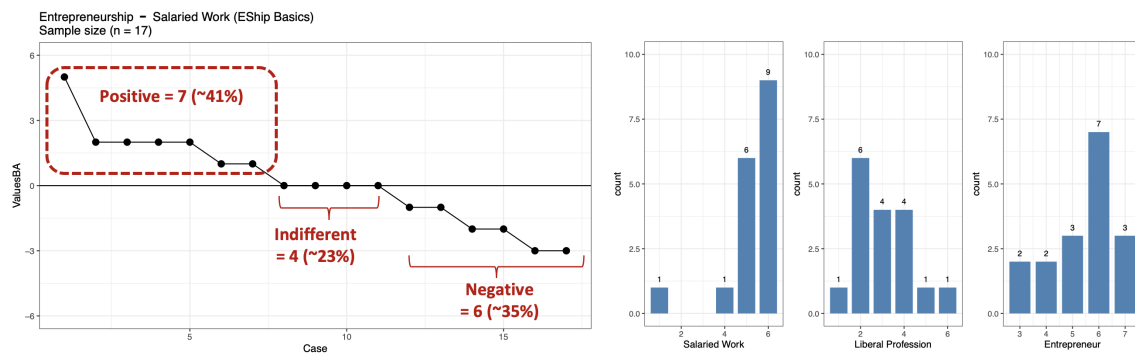


Figure 6.37: Entrepreneurial Orientation. Course: Entrepreneurship Basics

In Startup X, 17 Master students responded to the questionnaire. As a result, 76% of the students are attracted to entrepreneurship over salaried work, and three students (17%) are indifferent. In this course, the students' selection procedure is focused on identifying, addressing and attracting entrepreneurial students. Since the students filled out the questionnaire after the complete seminar, it can be assumed that they responded based on their beliefs. Therefore, the seminar selection procedure and the final composition of the target group can be characterized as successful. However, in all cases, a self-selection bias needs to

be considered in that context. Nine students gave a clear indication towards entrepreneurship, and nine students indicated salaried work.

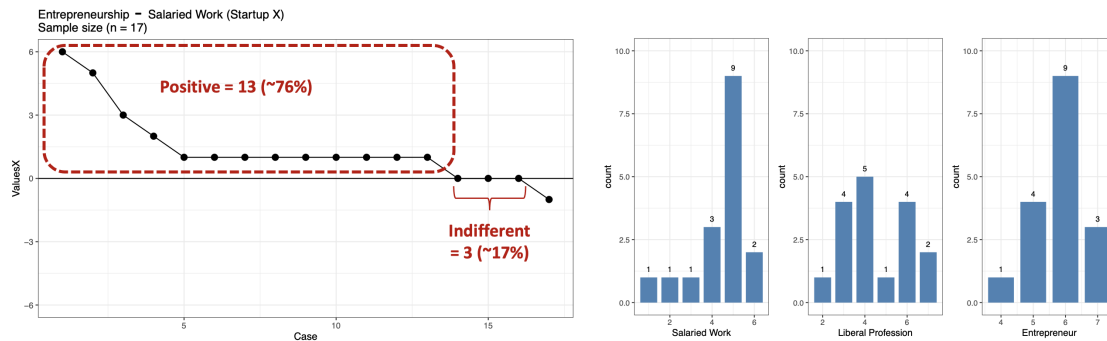


Figure 6.38: Entrepreneurial orientation. Course: Startup X

Finally, the international and interdisciplinary course "EPICUR Entrepreneurial Lab" was conducted and analyzed in the winter of 2021 with 8 Bachelor and Master students from three European universities. The students fulfilled and were selected based on the strict selection criteria that capture entrepreneurial orientation and their motivation for venture projects. As a result, 71% of the course participants were attracted to entrepreneurship over salaried work. Only two students (28%) were indifferent. Five students gave a clear indication towards entrepreneurship.

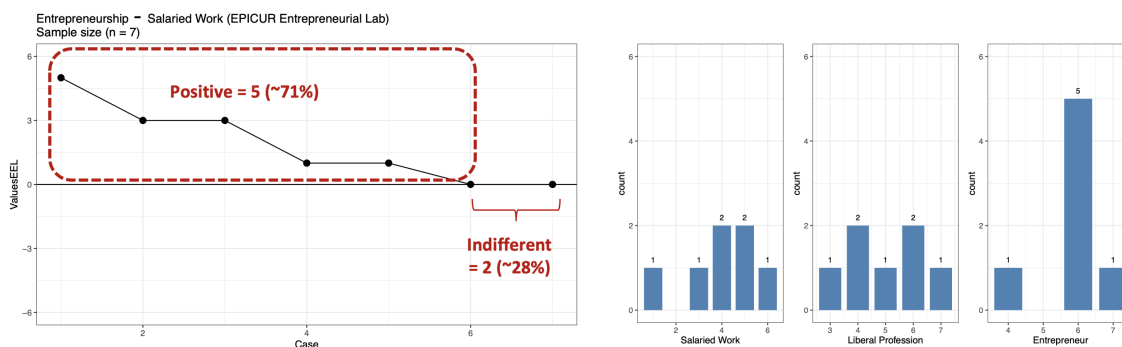


Figure 6.39: Entrepreneurial Orientation. Course: EPICUR Entrepreneurial Lab

## 6.9.2 Exploratory Factor Analysis

Factor analysis refers to a set of statistical procedures and studies aiming to determine the number of distinct (unobservable/latent) constructs represented by a set of measures. It is used in many fields, such as behavioral and social sciences, medicine, economics, and geography (Yong et al., 2013). The statistical procedures allow for detection and provide information on the number of underlying factors and the estimates of the strength and direction of influence

(factor loadings) of each measure on the factors (Fabrigar and Wegener, 2011; Beavers et al., 2013). Factor analysis is often used in the development and validation of scales in social sciences to establish and improve the accuracy of the resulting solution (Beavers et al., 2013). At the beginning of an inquiry, the theoretical model's underlying structure, including the direction of influence and the number and strength of factor loadings, may be unclear. An Exploratory Factor Analysis (EFA) needs to be performed in this case. This study develops a model based on theoretical considerations presented and discussed in the sections 6.5. Since new constructs were designed to represent the Ikigai framework, an EFA is performed to detect and analyze the structure of the data, detect the relationships between the items and exclude potential cross-factor loadings. Critical rules for conducting the EFA, interpreting the R output, its parameter and results are based on Watkins (2018); Hartmann and Waske (2018); Yong et al. (2013) and are adapted in the respective sections as reference.

## Sample Size

Sample size can be decisive in statistical analysis and the EFA. However, concrete and an unambiguous answer to the question: *What is the "right" sample size to conduct a reliable factor analysis?* is hard to find in the literature and vary between a minimum number of cases or a subjects-to-variables ratio, such as 5:1 or 10:1 (Watkins, 2018). Beavers et al. (2013) compiles different guidelines and illustrates that there is no consensus on that topic among scholars (p. 2): 51 more cases than the number of variables; at least 10 cases for each item, and the subjects-to-variables [STV] ratio should be no lower than 5; at least 100 cases and a STV ratio of no less than 5; at least 150 - 300 cases; at least 200 cases; at least 300 cases.

These numbers are representative examples of the information found within the literature on the optimum and sufficient number of cases in EFA. Interestingly, Beavers et al. (2013) reports that according to Fabrigar et al. (1999); MacCallum et al. (2001), "stable solutions can be reached with samples as low as 100 when three to four strong items (loadings of .70 or greater) comprise a factor, suggesting that weaker relationships need a larger sample size" (p. 3). However, a larger number of respondents (150 and more) could potentially lead to more reliable results (Yong et al., 2013). In his book, Kline (2015, p. 15) presents four sample size requirements:

1. Complex models including many parameters require a bigger sample size than simple models with fewer parameters.
2. Models with continuous and normally distributed variables require smaller sample sizes compared to models and analyses with non-normal distributions

3. If the score reliability is low or there is a higher level of missing data, a larger sample size is needed to offset the potentially distorting effects of measurement and compensate for the loss of information
4. Factor analysis requires a larger sample size if only a few indicators per factor exist or some indicators co-vary appreciably with multiple factors, or co-variances between factors are relatively low

The underlying study includes valid answers from 66 respondents after fixing or removing incorrect, corrupted, incorrectly formatted, duplicate, or incomplete data within the data set. Therefore, it is essential to discuss, analyze and choose the appropriate measurement model. The relatively low sample size limits to some degree the "quality" and statistical power of the operations, but it can provide a first indication of potential patterns and directions. It can be said that SEM is a large sample technique. Scholars require large samples and do not accept SEM studies with a small sample due to their inaccuracy when the sample size is low (Kline, 2015, p. 15). However, it is also true that "most published SEM studies are probably based on samples that are too small" (Kline, 2015, p. 16).

### **Determining the Number of Factors**

Different analytical strategies have been developed to determine the optimal number of factors. The most frequently used strategy is to retain all factors with an Eigenvalue greater than 1 (Kaiser-Guttman Criterion by Guttman (1954); Matsunaga (2010)). Other prominent and established rules and approaches are Scree tests for a visual analysis (Cattell, 1966) and the Maximum Likelihood Method (Park et al., 2002). The approaches to retaining the optimum number of factors are critically discussed in the literature. Researchers can come to different conclusions in choosing the right number of factors based on the method used. It is, therefore, important to take theoretical and statistical considerations. However, the Maximum- Likelihood method and Horn's Parallel Analysis (Horn, 1965) are reported to be stable and reliable (Matsunaga, 2010). In particular, the Parallel Analysis is strongly supported by the authors (Hayton et al., 2004; Henson and Roberts, 2006). As a result, the researcher can determine which items load on which factors and choose items with the highest factor loadings. The final pool of items should reflect and include only theoretically meaningful items. Researchers should consider dropping items with significant cross-factor loading and sampling errors. The goal is to achieve a simple structure where each factor is represented by several items that each load strongly on that factor only. Authors suggest that an item is considered a good factor identifier if the loading is 0.70 or higher and does not significantly cross load on another factor greater than 0.32 (Tabachnick and Fidell, 2001) or 0.40 (Beavers et al., 2013). Since the EFA is an iterative and exploratory process, it is also



acceptable to vary the number of factors retained and compare the solutions until the final set of items and factors makes sense conceptually and theoretically (ibid).

As a starting point, the original Ikgai constructs are analyzed. Together with the output variable of the theoretical model (Desirability of the Business Idea), the following Ikigai constructs are used to explore the underlying structure of the data and perform an EFA:

- Perceived Personal Values-Business Idea Fit (VB)
- Perceived Core Competences-Business Idea Fit (CB)
- Perceived Market Attractiveness (MA)
- Anticipated Profitability (AP)
- Desirability of the Business Idea (DBI)

If the data support the theoretical model, it is expected to get a clear output for five independent factors with sufficient (>0.5) factor loadings and no extensive cross-factor loadings. Before determining the number of factors for the Ikigai model, the conditions to perform an EFA are verified. For that, parallel analysis and the Scree test are deployed. The correlation heat map of the items is presented in figure 6.40.

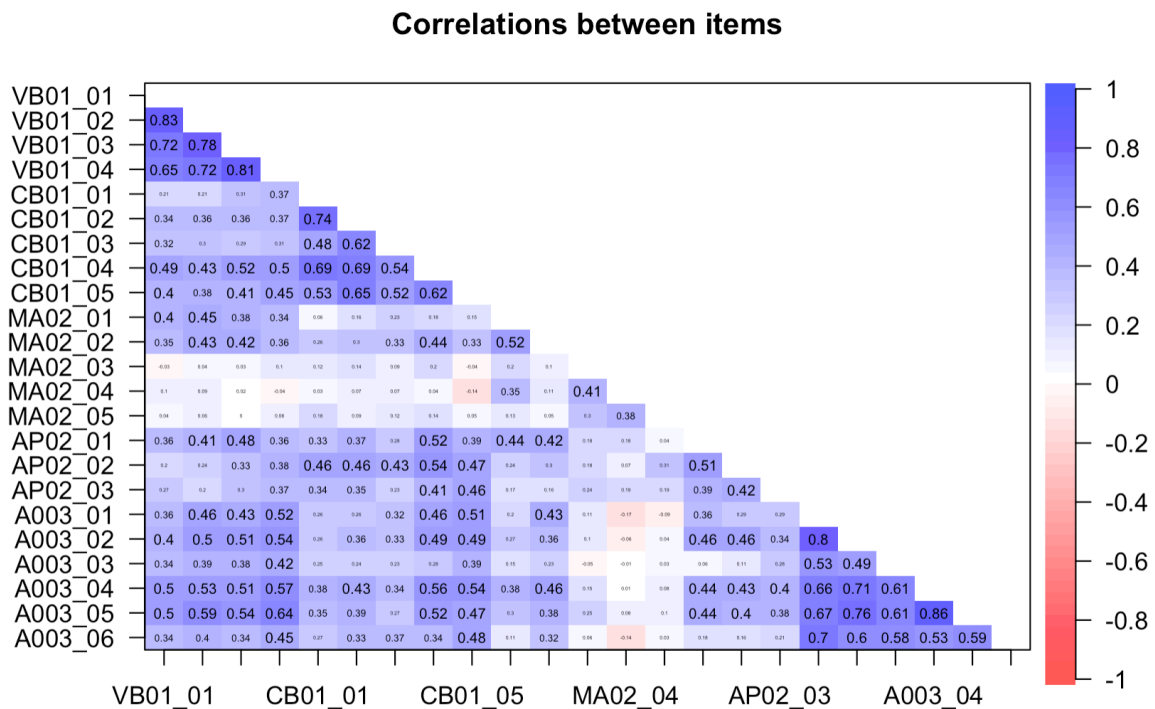


Figure 6.40: Correlation matrix of items

### Bartlett's Test of Sphericity

Bartlett's Test of Sphericity (Bartlett, 1950, 1951) is often performed before a data reduction technique can be used. The test's null hypothesis is that the variables are orthogonal, i.e. not correlated. The alternative hypothesis is that the variables are not orthogonal, i.e. they are correlated enough to where the correlation matrix diverges significantly from the identity matrix. If the p-value from Bartlett's Test of Sphericity is lower than a significance level of  $p=0.05$ , then our data set is suitable for a data reduction technique (Zach, 2019). As presented in figure 6.41, the p-value is below 0,5 and therefore, the null hypothesis is rejected. As a result, the data is suitable for further analysis.

```
cortest.bartlett(IKIGAI_EFA, n = 66, diag = FALSE)

R was not square, finding R from data

$chisq
[1] 968.8634

$p.value
[1] 2.605822e-84

$df
[1] 253
```

Figure 6.41: Result of Bartlett's Test of Sphericity run in R

### Kaiser, Meyer, Olkin Measure of Sampling Adequacy

The Kaiser-Meyer-Olkin (KMO) Test is another measure of how suited your data is for factor analysis. The test measures sampling adequacy for each variable in the model and for the complete model. The statistic is a measure of the proportion of variance among variables that might be common variance. The lower the proportion, the more suited your data is to factor analysis (Glen, 2022). Kaiser (1970) suggested that  $KMO > 0.9$  were marvelous, in the 0.80s, meritorious, in the 0.70s, middling, in the 0.60s, mediocre, in the 50s, miserable, and less than 0.5, unacceptable. As presented in figure 6.42, the overall MSA is 0.9 and the MSA for each item varies between 0.74 (middling) and 0.92 (marvelous) indicating that the sampling is adequate. From the output in fig. 6.42 it can be observed that most items have a value between 0,7 and 0,91. However, some market attractiveness items have a "miserable"

performance. The items are presented below for an evaluation and their relevance in the construct:

- MA02\_01 Estimate the anticipated market size for your offering.
- MA02\_02 Estimate the anticipated market growth in the next 5-10 years.
- MA02\_03 Estimate the anticipated intensity of your competitors.
- MA02\_04 Estimate the anticipated entry barriers to the market.
- MA02\_05 Estimate the anticipated threat of substitutes affecting your offering.

Market entry barriers, the intensity competition, and threat of substitutes are conceptualized as key determinants of a market attractiveness. To keep the construct’s conceptualization, it would therefore be not appropriate to delete these items. Additional tests in the following steps are needed to evaluate, if the construct can be kept or needs to be dropped. The Velicer’s minimum average partial (MAP) test can help to find the answer to that question.

```
KMO (IKIGAI_EFA)

Kaiser-Meyer-Olkin factor adequacy
Call: KMO(r = IKIGAI_EFA)
Overall MSA = 0.85
MSA for each item =
VB01_01 VB01_02 VB01_03 VB01_04 CB01_01 CB01_02 CB01_03 CB01_04
0.83 0.86 0.88 0.88 0.83 0.82 0.91 0.89
CB01_05 MA02_01 MA02_02 MA02_03 MA02_04 MA02_05 AP02_01 AP02_02
0.91 0.77 0.86 0.52 0.58 0.51 0.85 0.89
AP02_03 A003_01 A003_02 A003_03 A003_04 A003_05 A003_06
0.85 0.83 0.87 0.85 0.89 0.86 0.89
```

Figure 6.42: Kaiser-Meyer-Olkin (KMO) Test run in R

**Velicer’s minimum average partial (MAP) test**

Determining the number of factors using the Velicer’s minimum average partial (MAP) test with "varimax" rotation and Maximum Likelihood Method, the Velicer MAP achieves a minimum of 0.03 with five factors (figure 6.43). Thus, the results suggest to keep five factor as initially conceptualized.

```
nfactors(IKIGAI_EFA, rotate="varimax", fm= "mle")

Number of factors
Call: vss(x = x, n = n, rotate = rotate, diagonal = diagonal, fm = f
m,
      n.obs = n.obs, plot = FALSE, title = title, use = use, cor = cor)
VSS complexity 1 achieves a maximum of 0.82 with 1 factors
VSS complexity 2 achieves a maximum of 0.87 with 2 factors
The Velicer MAP achieves a minimum of 0.03 with 5 factors
Empirical BIC achieves a minimum of -617.62 with 4 factors
Sample Size adjusted BIC achieves a minimum of -30.67 with 8 fact
ors

Statistics by number of factors
```

Figure 6.43: MAP test run in R

### Parallel Analysis and Scree Test

Next method to determine the appropriate number of factors in exploratory factor analysis is the Parallel Analysis by Horn (1965). The following function is applied to perform a Parallel Analysis with the original five-factor model. Horn’s Parallel Analysis for factor retention results suggests four factors to retain. Another function to determine the sufficient number of factors is the Scree Test (see figure 6.45). A scree plot is a graphical method for determining the appropriate number of factors to retain in factor analysis or principal component analysis. The plot shows the eigenvalues of each factor or principal component, ordered from highest to lowest, and the point at which the slope of the plot changes represents the number of factors or components that should be retained.

This approach proposes a three-factor solution. The analytical tests indicate that the optimal number of factors is between three and four. In the following steps, the structure of the underlying data is analyzed. It will be possible to observe the factors and estimate the strength and direction factor loadings. During the EFA, the oblique rotation method "promax" can be chosen when there is theoretical reason to believe that the underlying factors are correlated or when empirical evidence suggests that the factors are related. The EFA output parameters are analyzed according to the common standards provided by Yong et al. (2013); Fabrigar et al. (1999); Beavers et al. (2013). The output of the analysis is presented in figure E.1.

The first parameter presented in the output is "uniquenesses". It ranges from 0 to 1 and is referred to as "noise", corresponding to the proportion of variability, which a linear

```

paran(IKIGAI_EFA, cfa=TRUE, graph=TRUE,
      color=TRUE, col = c("black", "red", "blue"))

```

```

Using eigendecomposition of correlation matrix.
Computing: 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Results of Horn's Parallel Analysis for factor retention
690 iterations, using the mean estimate

-----
Factor      Adjusted      Unadjusted      Estimated
           Eigenvalue   Eigenvalue      Bias
-----
1           7.172825     8.808654       1.635829
2           0.535800     1.921686       1.385886
3           0.422287     1.621818       1.199530
4           0.142226     1.191174       1.048948
-----

Adjusted eigenvalues > 0 indicate dimensions to retain.
(4 factors      retained)

```

Figure 6.44: Parallel Test run in R

combination of the factors can not explain. A high uniqueness for a variable indicates that the factors do not account for its variance. The uniqueness of the items of the market attractiveness are high and range between 0.54 (MA02\_01) and 0.86 (MA02\_05), indicating moderate to low values. Similarly, AP02\_03 has an unsatisfactory uniqueness value of 0.71.

In the next step, the loadings are analyzed. The loadings are the contribution of each original variable to the factor. An appropriate factor model results in low values for uniqueness and high values for communality. After several iterations, the market attractiveness and anticipated profitability items showed unsatisfactory results in uniqueness and loadings.

From an analytical point of view, the constructs need to be dropped. As a result, a three-factor model remains, including personal values-business idea fit, core competences-business idea fit, and perceived desirability of the business idea. The results of the reduced and optimized version of the factor analysis are presented in fig. E.2. It includes satisfactory values of item uniqueness, clear factors structure and sufficient factor loadings. In addition, it shows a p-value of 0,0234. As a result, the optimized model could be developed after removing the market attractiveness (MA) and the anticipated profitability constructs from the

### Non Graphical Solutions to Scree Test

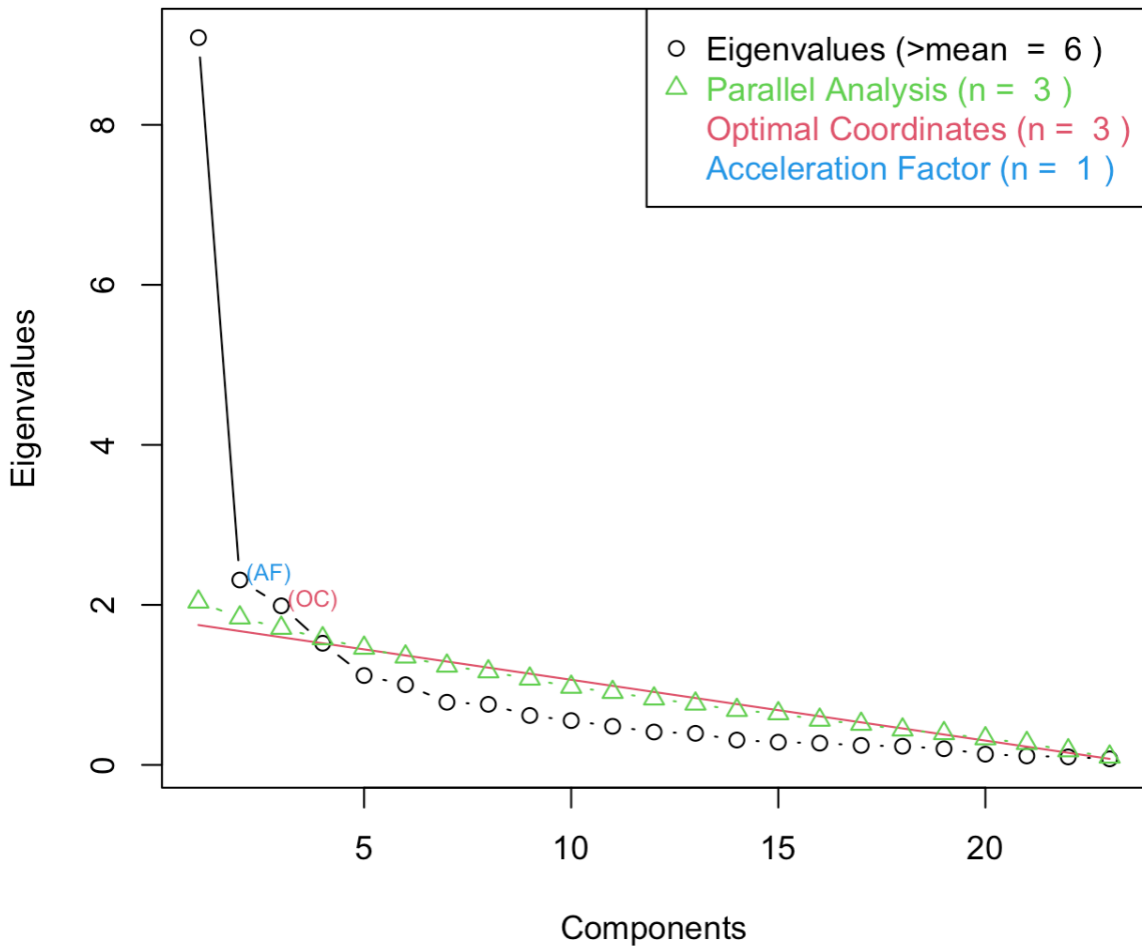


Figure 6.45: Scree Test run in R

model in future studies. Based on the theoretical considerations, it is worth retaining as many constructs as possible to validate the Ikigai components. But the EFA shows that a five-factor model is insufficient. Based on the quality indicators discussed above, a three-factor model is statistically a better choice.

However, theoretical considerations of the Ikigai framework suggest that combining the four critical Ikigai factors can lead to a "life worth living" or, in the underlying case, to a "business idea worth realizing". For that reason, dropping two of the four constructs would not allow testing the Ikigai theory, which is critical to that thesis. As mentioned above, the EFA aims to detect the relationships between the items, regroup the variables into a limited set of clusters and exclude potential and significant cross-factor loadings (Yong et al., 2013). It is often used when the data's underlying structure is unclear. The EFA could confirm that three of the five factors are coherent and consistent. However, market attractiveness and

anticipated profitability constructs can be reviewed in later studies for more accuracy. In this study, the items of the two constructs will be critically inspected and tested within the SEM.

Iterative selection and testing of critical items for market attractiveness were performed to obtain a good model fit and keep the key concept of the constructs. The set and item configuration presented in fig. 6.49 indicates satisfactory results. The principal component analysis in fig. E.3 shows a good RMSR value of 0,05. The visual and analytical tests suggest a three to four-factor solution. The decision to leave the five Ikigai factors is based on the theoretical consideration and the principal component analysis results. A structural equation modelling will analyze a five-factor model in the following sections.

### **6.9.3 Developing a Structural Equation Model**

Tarka (2018, p. 322) gives an extensive overview of the historical development of structural equation models (SEM) and points out that today, the SEM "is the most widely recognized statistical solution in the social sciences". The following chapter is based on the guidelines by Wang and Wang (2019) and Weiber and Mühlhaus (2014) on developing an SEM. More specifically, guidelines by Hair et al. (2019); Hair Jr et al. (2021) are used to develop and evaluate a PLS-SEM. In the subsequent sections, the model is developed to test the set of hypotheses presented in table 6.13 using the SEMinR package (Ray et al., 2021) in R.

The main study aims to measure the effects of the operationalized Ikigai framework components on the desirability of the business idea and to test the hypotheses. For that, a structural equation model needs to be defined and developed. The structural equation model aims to map the causal relationships formulated in a linear equation system. In the following sections, the foundations and the development of the Structural Equation Model (SEM) is described by following the main steps presented by Weiber and Mühlhaus (2014); De Carvalho and Chima (2014); Weston and Gore Jr (2006). Next, the model is specified and assessed according to the guidelines and procedures introduced by Hair et al. (2013); Hair Jr et al. (2017); Hair et al. (2019); Hair Jr et al. (2021). Structural equation models (SEM) represent a priori formulated and theoretically and logically based complex relationships between variables in a linear equation system (Weiber and Mühlhaus, 2014). The SEM can be considered as a combination of factor and path analysis, including two primary components: I) the measurement model, which describes the relationships between observed variable(s) and the construct(s), and II) the structural model, which describes interrelationships among constructs (Weston and Gore Jr, 2006). The procedure to develop an SEM presented below is based on recommendations provided by Weiber and Mühlhaus (2014).

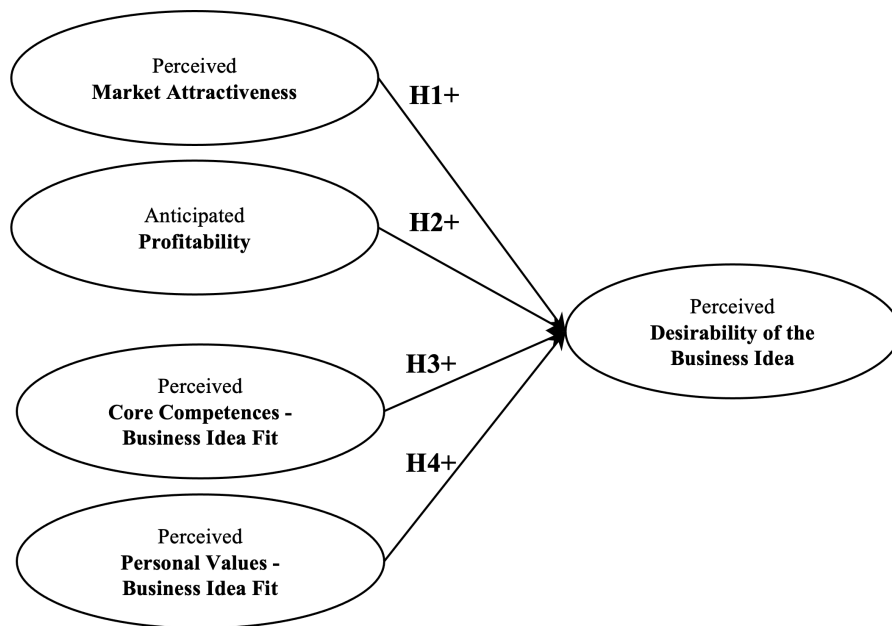


Figure 6.46: Theoretical Model based on the Ikigai Framework

The starting point in structural equation modelling is a detailed theoretical and/or logical justification of a system of hypotheses. The following section presents the primary considerations needed to develop and test the scientifically sound hypothesis, define latent variables, and a structural equation model based on De Carvalho and Chima (2014); Weiber and Mühlhaus (2014); Kline (2015). In general, hypotheses contain statements that are free of contradictions and can be justified from the theory under consideration but whose validity, in reality, is only assumed. Hypotheses are called "scientific" if they meet the following criteria Döring and Bortz (2006, p. 4):

- The hypothesis is related to real facts that can be empirically investigated.
- The statement of a hypothesis is generally valid, i.e. it contains an assertion that goes beyond the individual case or a singular event.
- The hypothesis is at least implicitly based on the formal structure of a meaningful conditional proposition.
- The conditional theorem must be potentially falsifiable, i.e. events must be conceivable which contradict the conditional theorem.

Formulating a hypothesis as a conditional statement includes "if-then" or "the more/-less..., the more/less..." statements. Conditional clauses imply a causal relationship between the if-component and the then-component. The if-component reflects the assumptions or



conditions (so-called antecedences) under which the then-component follows as a consequence (Weiber and Mühlhaus, 2014). Latent variables (also called hypothetical constructs or theoretical variables) are characterized by the fact that they are not directly observable on the empirical and practical levels. Appropriate measurement models are therefore required to grasp the manifestations of a latent variable in reality. The structural model describes the theoretically presumed connections between the latent variables. The endogenous variables are explained by the causal relationships assumed in the model, with the exogenous variables serving as explanatory variables that are not themselves explained by the causal model.

Nr.	Hypothesis	Expected relation
H1:	The higher the perceived market attractiveness, the higher the desirability of the business idea.	Significant   Positive
H2:	The higher the anticipated profitability, the higher the desirability of the business idea.	Significant   Positive
H3:	The higher the perceived fit between the core competences and the business idea, the higher the the desirability of the business idea.	Significant   Positive
H4:	The higher the perceived fit between the personal values and the business idea, the higher the desirability of the business idea.	Significant   Positive

Table 6.13: Hypotheses to be tested by the PLS-SEM

## Specification of the Measurement Model

Model formulation refers to the correct specification of the SEM using theory or empirical findings as a foundation. A SEM includes both a *measurement* and a *structural* model visually represented in a path diagram using latent (factors) and observed variables (also called measured variables, manifest variables or indicators). As a convention, latent variables are indicated in circles and indicators are represented in boxes. Lines indicate the relationship between variables (Wang and Wang, 2019). An overview of a general SEM, including a measurement and a structural model, is presented in figure 6.47.

According to Weiber and Mühlhaus (2014), the measurement of hypothetical constructs for which no direct behavioural or construct observations are possible requires the development and definition of measurement models. "The main purpose of a measurement model is to describe how well the observed indicator variables serve as a measurement instrument for the underlying latent variables of factors" (Wang and Wang, 2019, p. 4). The following section will calculate the theoretical model (see fig. 6.46) with an SEM approach.

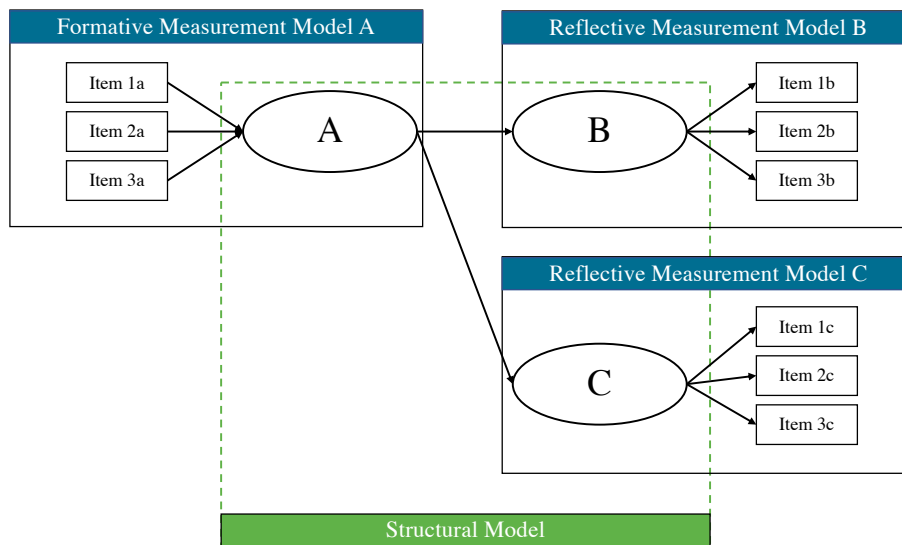


Figure 6.47: Structural Model and the Measurement Models. Inspired by Nachtigall et al. (2003)

The specification of a measurement model refers to the decision between *formative* or *reflective* measurement models. The relationship between the indicators and the underlying constructs can be formative or reflective. The precise definition and specification of a model are of outstanding importance because it has significant consequences for the formulation and selection of the items and the test methodology used. Latent variables are assessed by observable measures (indicators). The measurement model describes the relationship between these manifest indicators and the latent construct. For a long time, latent constructs in economics and social sciences were exclusively analyzed by reflective measurements. The measurement model is reflective if the causality flows from the latent variable to the indicators. It is a formative model if it flows from the indicators to the latent construct. In a reflective measurement model (see fig. 6.48 (right)), the latent construct  $\eta$  is modelled as a function of its observable indicators  $X_1, X_2, X_3$ . Accordingly, the measurement indicators must reflect observable “effects” or “consequences” of the effectiveness of a construct at the observation level (Weiber and Mühlhaus, 2014). A specific characteristic of reflective measurement models is the interpretation of latent constructs as the cause of observable indicators. Due to this assumption of causality, a change in the construct B is indicated (reflected) by a change in all indicators (Christophersen and Grape, 2009).

In a formative measurement model (see fig. 6.48 (left)), the latent construct is associated with a weighted composition of its indicators. In the case of formative measurement models, causality between the latent construct and the indicators is assumed. A specific characteristic of formative measurement models is their interpretation of indicators as the cause of the latent construct. This assumption of causality follows that a change in one or more indicators

causes a change in the construct (Christophersen and Grape, 2009). Since the main difference between reflective and formative measurement models is indicated by the reversal of the direction of the relationship or the assumed causality between the measurement variable and a latent variable, they also require different instruments for verification. In reflective models, the indicators are affected by the latent variable, whereas in formative models, the indicators define the latent variable.

While reflective measurement models are verified using confirmatory factor analysis, a regression-analytical approach is required for formative measurement models (Weiber and Mühlhaus, 2014). Therefore, authors have developed frameworks for assessing reflective and formative models to support researchers in their model specification process. The frameworks are guidelines and include questions about the latent constructs under consideration. Guiding frameworks can be found in MacKenzie et al. (2005); Weiber and Mühlhaus (2014); Christophersen and Grape (2009); Coltman et al. (2008). Latent constructs presented in table 6.15 were systematically analyzed according to the defining criteria suggested by MacKenzie et al. (2005, p. 713) to define the formative or reflective measurement model. The criteria and decision algorithm are presented in table 6.14. The specification and conceptualization of the constructs are shown in table 6.15.

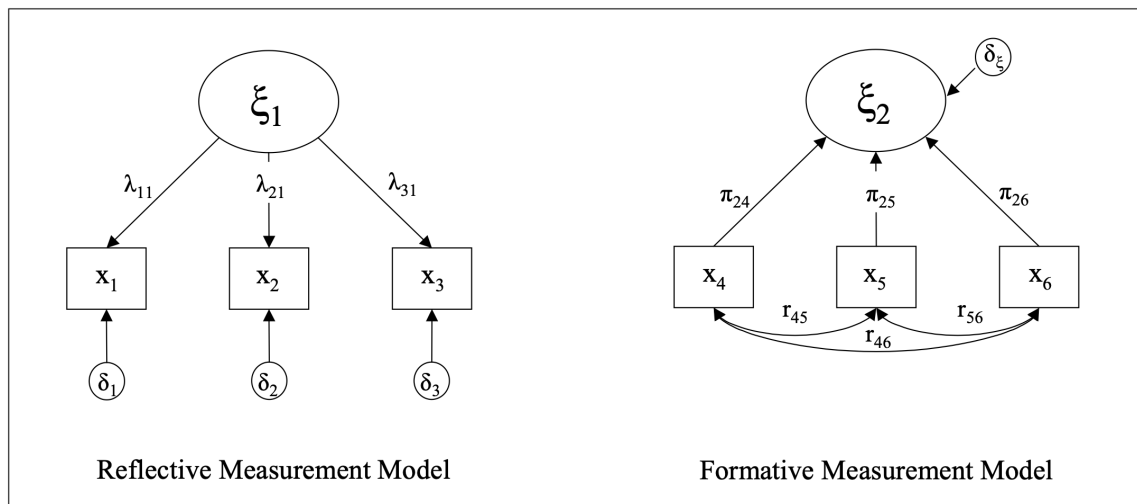


Figure 6.48: Formative measurement vs. reflective measurement. Source: Götz et al. (2010, p. 694)

Criteria	Formative Model	Reflective Model
Nature of construct	Construct is formed	Construct is existing
Direction of Causality	Indicator → Construct	Construct → indicator

*Continued on next page*

Table 6.14 – *continued from previous page*

<b>Criteria</b>	<b>Formative Model</b>	<b>Reflective Model</b>
Are the indicators the defining characteristics of the construct or manifestations of it?	If the measures represent defining characteristics that collectively explain the meaning of the construct, a formative indicator measurement model should be specified	If the measures are manifestations of the construct in the sense that they are each determined by it, a reflective indicator model is appropriate.
Do the indicators appear to be conceptually interchangeable?	If the indicators are formative, they may not necessarily share a common theme, and each may capture a unique aspect of the conceptual domain.	If the measures are reflective, they should share a strong common theme, and each should capture the essence of the domain of the construct. Indeed, reflective measures are typically viewed as being sampled from the same conceptual domain.
Would the indicators be expected to covary with each other?	A formative indicator measurement model makes no predictions about the correlations among the measures. They might be high, low, or somewhere in between.	A reflective indicator measurement model explicitly predicts that the measures should be strongly correlated with each other because they share a common cause (i.e., they all reflect the same underlying latent construct).

*Continued on next page*

Table 6.14 – *continued from previous page*

Criteria	Formative Model	Reflective Model
Are all indicators expected to have the same antecedents and/or consequences?	Formative indicators are not necessarily interchangeable and may tap unique aspects of the conceptual domain. Thus, they would not necessarily be expected to have similar antecedents and consequences	Reflective indicators of a construct should all have the same antecedents and consequences because they all reflect the same underlying construct and are supposed to be conceptually interchangeable.

Table 6.14: Framework for assessing reflective and formative models. Source: Adapted from MacKenzie et al. (2005, p. 713) and Coltman et al. (2008)

After analyzing the directions of causality and the conditions provided in table 6.14, it can be concluded that some constructs (e.g. Perceived Market Attractiveness) represent a formative model using the concept of multiple items. Other constructs (e.g. Personal Values-Business Idea Fit) represent reflective constructs. In contrast to a reflective measurement model, a formative measurement model can inspect which influencing factors determine a hypothetical construct and how decisive the factor is. This question is of particular importance in practical applications. Thus, formative measurement models provide more valuable and additional information than reflective measurement models, which "only" depict the consequences of the effectiveness of a construct, in reality, (Weiber and Mühlhaus, 2014).

ID	Items and Constructs	Specification
<b>Personal Values - Business Idea Fit (VB)</b>		
VB01	The business idea fits well to my personal values	Reflective
VB02	My personal values are well reflected in the business idea	Reflective
VB03	The business idea represents what is important to me	Reflective
VB04	The business idea motivates me doing what is important to me	Reflective
<b>Perceived Market Attractiveness (MA)</b>		
MA01	Estimate the anticipated market size for your offering	Formative
MA02	Estimate the anticipated market growth in the next 5-10 years	Formative
MA03	Estimate the anticipated intensity of your competitors	Formative
MA04	Estimate the anticipated entry barriers to the market	Formative

*Continued on next page*

Table 6.15 – continued from previous page

<b>ID</b>	<b>Items and Constructs</b>	<b>Specification</b>
MA05	Estimate the anticipated threat of substitutes affecting your offering	Formative
<b>Anticipated Profitability (AP)</b>		
AP01	Estimate the anticipated long-term profitability	Formative
AP02	Estimate the anticipated potential to increase the profitability over time through efficiency gains	Formative
AP03	Estimate the anticipated potential to increase the profitability through additional revenue streams	Formative
<b>Perceived Core Competences - Business Idea Fit (CB)</b>		
CB01	With my core competences it would be very easy for me to realize the business idea	Reflective
CB02	With my core competences, I can control the realization process of my business idea	Reflective
CB03	I know the necessary practical steps to realize my business idea	Reflective
CB04	I have the right skills to realize my business idea	Reflective
CB05	If I tried to realize my business idea applying my core competences, I would have a high probability of succeeding	Reflective
<b>Desirability of the business idea (DBI)</b>		
DBI01	After my studies, I would love to realize this business idea	Reflective
DBI05	Realizing the business idea would entail great satisfactions for me	Reflective

Table 6.15: Construct Specification

The type of the underlying model determines the type of SEM techniques and calculations to be used. For that, two main SEM statistical techniques have been established. Researchers use them to analyze social phenomena and latent constructs: Partial-Least-Squares-based (PLS) and Covariance-based (CB) SEM (Gefen et al., 2000). To decide which statistical SEM approach best fits the model, authors developed guidelines and practical support for researchers (see, e.g., Rigdon et al. (2017); Dash and Paul (2021); Gefen et al. (2000); Hardin et al. (2011); Hair et al. (2019)). Hair et al. (2019, p. 5) recommends using a PLS-SEM when:

- The analysis is concerned with testing a theoretical framework from a prediction perspective; ✓

- The structural model is complex and includes many constructs, indicators and/or model relationships; (✓)
- The research objective is to understand better increasing complexity by exploring theoretical extensions of established theories (exploratory research for theory development); ✓
- The path model includes one or more formatively measured constructs; ✓
- The research consists of financial ratios or similar types of data artefacts; ✘
- The research is based on secondary/archival data, which may lack a comprehensive substantiation on the grounds of measurement theory; ✘
- A small population restricts the sample size (e.g. business-to-business research); but PLS-SEM also works very well with large sample sizes; ✓
- Distribution issues are a concern, such as lack of normality;<sup>15</sup> (✓)
- Research requires latent variable scores for follow-up analyses. ✓

A critical analysis and reflection on the constructs reveal that the aspects mentioned above fit well with the underlying data, especially regarding the small sample size and formative measured constructs. Therefore, the PLS-SEM approach is chosen for the model formulation and specification. Although the covariance-based structural equation modelling (CB-SEM) was a dominant method for analyzing complex interrelationships between observed and latent variables, more and more PLS-SEM models emerged in recent years and became popular among researchers (Hair et al., 2019). Today, there is a strong and "heated" scientific debate (Henseler et al., 2016) on which method to use and which is more precise (see Dijkstra (2014); Dash and Paul (2021); Rigdon (2014); MacKenzie et al. (2005); Diamantopoulos (1999)). In his assessment of partial least squares structural equation modelling in marketing research, Hair et al. (2012) reviews PLS-SEM research and presents 204 articles in the top 30 marketing journals with PLS-SEM applications. Therefore, it can be concluded that the methodology is established and an appropriate alternative to the common co-variance-based approach.

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<sup>15</sup>The mean value of the constructs were analyzed with density (fig D.2) and Q-Q plots (fig D.3) as well as with the Shapiro-Wilk-Test (Shapiro and Wilk, 1965). The visual analysis of the individual constructs indicates that the constructs are normally distributed. However the item-level analysis reveals that the individual items are not normally distributed.

## Model Formulation

The model formulation, calculation, and evaluation were implemented in R according to the practical guidelines by Hair Jr et al. (2021); Hair et al. (2019); Soumya Ray (2020). First, the measurement (outer) model is defined by specifying composite or reflective constructs and assigning indicators to constructs (Henseler et al., 2016). The definition of the measurement model and construct definition (formative vs reflective) is based on the considerations in table 6.15. Next, the structural (inner) model is defined by specifying the relationships between the constructs. Here, the theoretical considerations concerning Ikigai and the visual representation in figure 6.46 are applied. The definition of the structural and measurement model in R is presented in figure 6.49.

```
#####
#Creating Measurement Model
#####

IKIGAI_Measurement_Model <- constructs(
  reflective("PV_BI_FIT",      multi_items("VB01_0", 1:4)),
  reflective("C_BI_FIT",      multi_items("CB01_0", c(2,3,4,5))),
  composite("MA",             multi_items("MA02_0", 1:5), weights = regression_weights),
  composite("AP",             multi_items("AP02_0", 1:3), weights = regression_weights),
  reflective("DBI",           multi_items("A003_0", c(1,5)))

#####
#Creating Structural Model
#####

IKIGAI_Structural_Model <- relationships(
  paths(from = c("PV_BI_FIT", "C_BI_FIT", "MA", "AP"), to = "DBI"))

#####
#Estimating the model with PLS
#####

IKIGAI_PLS_Model <- estimate_pls(
  data = IKIGAI_ITEMS,
  measurement_model = IKIGAI_Measurement_Model,
  structural_model = IKIGAI_Structural_Model,
  inner_weights = path_weighting)
```

Figure 6.49: Specification of the Measurement and Structural Model

According to Henseler et al. (2016, p. 9), PLS model results can be assessed globally (i.e. for the overall model) and locally (for the measurement models and the structural model). The following steps are performed according to Hair et al. (2019); Hair Jr et al. (2021). According to Hair et al. (2019), the first step in evaluating PLS-SEM results involves examining the measurement models. For that, reflective and formative models need to be analysed separately. Figure 6.50 presents the evaluation algorithm and the individual steps for performing PLS-SEM evaluation.



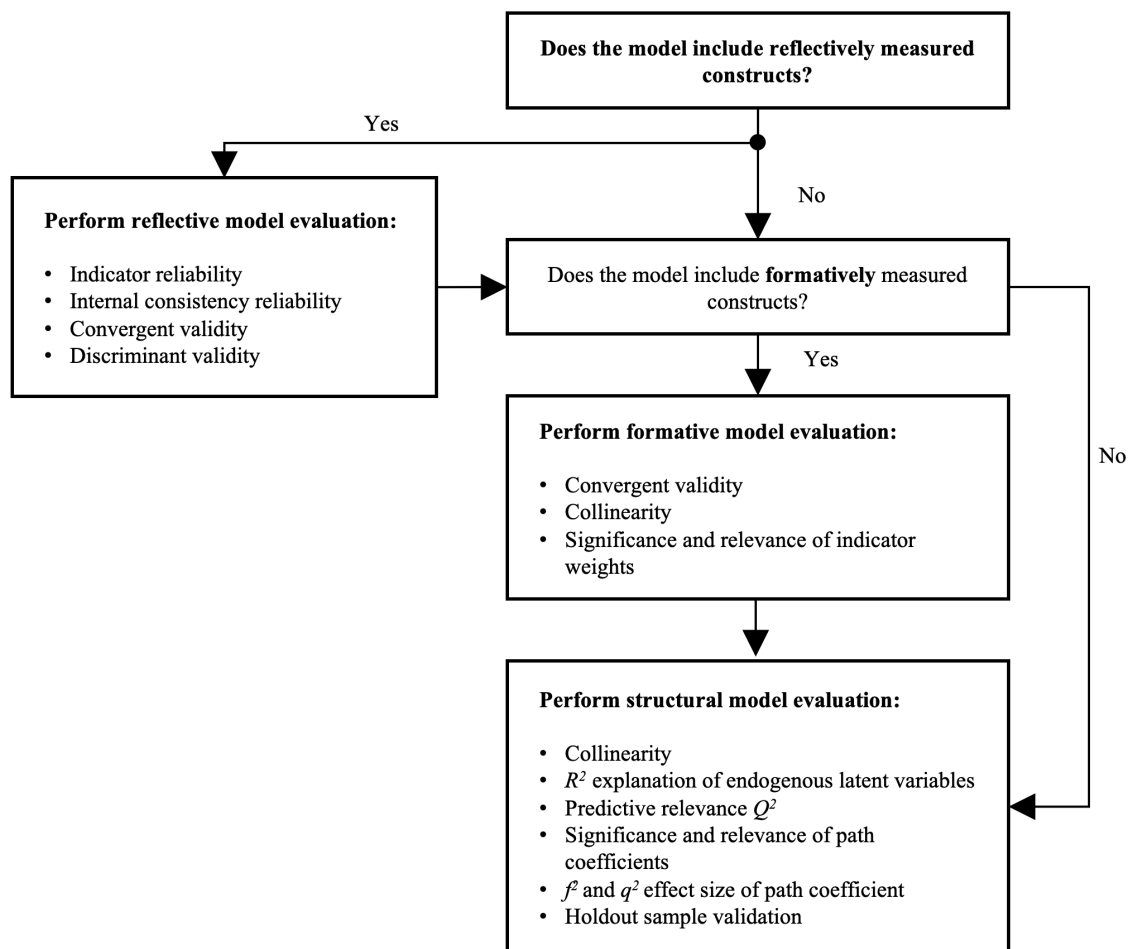


Figure 6.50: PLS-SEM model evaluation (visually modified). Source: Sarstedt et al. (2021, p. 15)

The following sections and analytic procedures are based on the workbook by Hair Jr et al. (2021). The procedure is very similar to the algorithm in figure 6.50 and covers the essential quality criteria on construct and item level.

### 6.9.4 Evaluation of Reflective Measurement Models

#### Assessing the indicator reliability

Indicator reliability "is the square of a standardized indicator's indicator loading. It represents how much of the variation in an item is explained by the construct and is referred to as the variance extracted from the item" (Hair Jr et al., 2021, p. 186). For the evaluation of reflective measurement models, the indicator loadings need to be analyzed. Hair et al. (2019) recommends loadings above 0.708, "as they indicate that the construct explains more than 50 per cent of the indicator's variance, thus providing acceptable item reliability" (p. 8). The

Ikigai model includes three reflectively formulated constructs: Personal Values- Business Idea Fit (VB), Core-Competences- Business Idea Fit (CB) and the Desirability of the Business Idea (DBI). As presented in table 6.16, most indicators are above the threshold of 0.708. Items CB01\_01-CB01\_03 load only 0,499, 0.628, and 0.621, respectively, indicating a low loading. The item with the lowest loading (CB01\_01) should be removed. However, the items CB01\_02 and CB01\_03 are critical for the construct and should be obtained. The item reliability of the reflective measurement model is therefore ascertained. The calculation of indicator reliability can be performed by squaring the indicator loading values (see table 6.17) and should be above 0.5 (Hair Jr et al., 2021). As a result of the indicator loading and reliability analysis, the item CB01\_01 ("With my core competences it would be very easy for me to realize the business idea.") will be dropped.

	VB	CB	DBI	> 0.708
VB01_01	0.797		✓	
VB01_02	0.923		✓	
VB01_03	0.828		✓	
VB01_04	0.949		✓	
CB01_01		0.499		✗
CB01_02		0.628		ok
CB01_03		0.621		ok
CB01_04		0.926		✓
CB01_05		0.912		✓
DBI03_01			0.806	✓
DBI03_05			0.904	✓

Table 6.16: Indicator loadings of reflective constructs

	VB	CB	DBI	> 0.5
VB01_01	0.634		✓	
VB01_02	0.853		✓	
VB01_03	0.685		✓	
VB01_04	0.901		✓	
CB01_01		0.395		✗
CB01_02		0.386		ok
CB01_03		0.621		✓
CB01_04		0.857		✓
CB01_05		0.831		✓
DBI03_01			0.652	✓
DBI03_05			0.814	✓

Table 6.17: Indicator reliability of reflective constructs

## 2. Assessing internal consistency reliability

Internal consistency reliability "is a form of reliability used to judge the consistency of results across items on the same test. It determines whether the items measuring a construct are similar in their scores (i.e., if the correlations between items are strong)" (Hair Jr et al., 2021, p. 187). Instead of using the standard measure of internal consistency, Cronbach's Alpha, Hair et al. (2019) suggests applying the composite reliability. According to Hair et al. (2019), values between 0.60 and 0.70 are considered "acceptable in exploratory research," and values between 0.70 and 0.90 range from "satisfactory to good." To assess the composite reliability, composite reliability values are presented in table 6.18. In that case, Alpha, rhoC, and rhoA should exceed 0.7, while AVE should exceed 0.5 for reflectively measured constructs. As a result, it can be confirmed that all three constructs have high levels of internal consistency reliability.

	alpha	rhoC	AVE	rhoA	
VB	0.93	0.93	0.77	0.93	✓
CB	0.87	0.86	0.62	0.89	✓
DBI	0.84	0.85	0.73	0.85	✓

Table 6.18: Composite reliability of reflective constructs

## 3. Convergent validity of construct

Convergent validity "is the degree to which a reflectively specified construct explains the variance of its indicators. The convergent validity (average variance extracted (AVE)) for VB is 0.77, for CB 0.62, and for DBI the AVE is 0.73 (see table 6.18). As presented above, an AVE is recommended to have a value over 0.5 to explain at least 50 per cent of the variance of its items. All factors have an AVA value higher than 0.5. The convergent validity is therefore ascertained.

## 4. Discriminant validity of constructs

Discriminant validity is "the extent to which a construct is empirically distinct from other constructs in the structural model" (Hair et al., 2019, p. 9). For that, a heterotrait-monotrait (HTMT) ratio of the correlations is used to examine and determine the discriminant validity of the constructs (see table 6.19). In addition, Hair Jr et al. (2021) recommends testing if the HTMT values are significantly different from 1 or a lower threshold. The columns labelled 5% CI and 95% CI show the lower and upper boundaries of the 90% confidence interval. The researcher must evaluate if the upper boundaries confidence interval is lower

than the threshold of 0.85 (Henseler et al., 2015). Table 6.20 presents the respective values and demonstrates the discriminant validity of the constructs.

	VB	CB	DBI	> 0.85
CB	0.57			✓
DBI	0.76	0.60		✓

Table 6.19: Discriminant validity of constructs 1

	Original Est.	Boot.Mean	Boot.SD	T Stat.	5% CI	95% CI	CI < 0.85
VB → CB	0.57	0.56	0.10	5.92	0.39	0.71	✓
VB → DBI	0.76	0.76	0.06	13.82	0.66	0.84	✓
CB → DBI	0.60	0.61	0.10	5.81	0.42	0.77	✓

Table 6.20: Discriminant validity of constructs 2

In conclusion, the evaluation of the reflective model shows promising results. Indicator reliability, internal consistency, and convergent and discriminant validity of constructs indicate measures according to the respective threshold values. The item CB01\_01 had a low loading (0.499) and demonstrated low reliability (0.395). As a result, this item was removed from the model.

### 6.9.5 Evaluation of Formative Measurement Models

In the underlying model, two factors have been defined as formative (Market Attractiveness (MA) and Anticipated Profitability (AP)). These two factors will be analysed in the following steps according to the quality assessment criteria presented by Hair Jr et al. (2021).

#### 1. Assessment of Convergent Validity

The convergent validity in formative measurement models is also called "Redundancy Analysis" (Hair Jr et al., 2021). Each formatively defined construct needs to be analysed separately using a single-item measure with a generic assessment. This type of global measure must be included in the research design and the questionnaire. Most of the items were newly designed or adapted from validated scales. The items were reviewed to define an appropriate single-item measure for the formative constructs. One best-representing item was chosen as a candidate for a single-measurement item representing the construct best. Anticipated profitability (AP): "Estimate the anticipated long-term profitability" and Market attractiveness (MA): "Estimate the anticipated market size for your offering" The results of the convergent validity analysis are presented in table 6.21. The redundancy

analyses of MA yield estimates of 0.570 and 0.549, respectively. Thus, unfortunately, the formatively measured constructs do not exhibit convergent validity. The potential reason for that phenomenon is that the single-item measure is not efficient enough and should be modified in later studies. However, market attractiveness and anticipated profitability are difficult to measure in a single-item approach. For future studies, the following single-item measure could be tested for MA: "The current market is highly attractive for my business offer". For AP: "My product or service will be highly profitable in the next 5-10 years". In addition to that, the two constructs are indeed similar to each other. "What the word needs?" (MA) has a substantial overlap conceptually with "What you will be paid for?" (AP).

	Redundancy	R <sup>2</sup>	AdjR <sup>2</sup>	≥ 0.708
MA	0.549	0.301	0.291	✘
AP	0.570	0.325	0.315	✘

Table 6.21: Assessment of Convergent Validity for Formative Constructs

## 2. Checking for Indicator Collinearity

When two indicators are highly correlated, collinearity can occur. "The variance inflation factor (VIF) is often used to evaluate collinearity of the formative indicators. VIF values of 5 or above indicate critical collinearity issues among the indicators of formatively measured constructs." (Hair et al., 2019, p.10). The VIF values are recommended to be close to 3 and lower (ibid). The formative indicators in the underlying model are MA and AP. Multicollinearity can be a problem because it undermines the statistical significance of an independent variable. Rules of thumb for formative measurement model assessment can be found in Hair Jr et al. (2021, p. 96). The following values are suggested to assess collinearity: Critical collinearity issues likely occur if VIF > 5. Collinearity issues are usually uncritical if VIF = 3 – 5. According to the results in table 6.22, all VIF values are between 3-5, indicating acceptable results. Therefore, collinearity does not reach critical levels in any formative measurement models. Hence, it is not an issue to estimate the Ikigai model.

## 3. Statistical significance and relevance of the indicator weights

Testing for significance "is the process of testing whether a certain result likely has occurred by chance (i.e., whether an effect can be assumed to truly exist in the population). To test whether a parameter is significant, we need to compare the t-values – derived from bootstrapping – with the critical values from the standard normal distribution. Alternatively, we can inspect bootstrap confidence intervals." (Hair Jr et al., 2021, p. 192). For that, the indicator weights are analyzed for their significance and relevance. The critical values for

	MA	AP	VIF < 3
MA02_01	1.482		✓
MA02_02	1.363		✓
MA02_03	1.198		✓
MA02_04	1.266		✓
AP02_01		1.431	✓
AP02_02		1.476	✓
AP02_03		1.249	✓

Table 6.22: Collinearity Test using the Variance Inflation Factor (VIF)

significance levels of 5%, probability of error is 1.960 (Hair Jr et al., 2021). Looking at the significance levels ( $t$ ) in table 6.23, it can be concluded that many formative indicators are not statistically significant at a 5% level. In addition, for these indicators, the 95% confidence intervals include the value zero. On the other hand, the indicators CB01\_05, MA02\_02, AP02\_01, and AP02\_03 are significant. Next, the indicators' absolute importance is examined.

	O.Est.	Boot.Mean	Boot.SD	T Stat.	2.5% CI	97.5% CI	$t \geq 1.960$
MA02_01 → MA	0.35	0.33	0.19	1.85	0.00	0.62	ok
MA02_02 → MA	0.68	0.63	0.17	3.91	0.36	0.89	✓
MA02_03 → MA	0.34	0.32	0.22	1.59	-0.08	0.64	✗
MA02_04 → MA	-0.35	-0.35	0.23	-1.51	-0.71	0.06	✗
MA02_05 → MA	0.10	0.10	0.20	0.52	-0.19	0.45	✗
AP02_01 → AP	0.46	0.44	0.22	2.07	0.07	0.78	✓
AP02_02 → AP	0.48	0.47	0.21	2.27	0.10	0.79	✓
AP02_03 → AP	0.33	0.32	0.20	1.69	-0.01	0.62	✗

Table 6.23: Significance test of formatively constructed factors

To assess the indicators' absolute importance on the construct, the indicators' loadings are examined (see table 6.24). Here, the lowest indicator loading (O.Est for Original Estimation) is MA02\_04 indicating a negative loading on Market attractiveness. In addition to that, the results in table 6.24 show that the  $t$ -values of the indicator loadings are clearly above 2.576, suggesting that most indicator loadings are significant at a level of 1% (probability of error: 2.576). MA02\_03 and MA02\_04 are here also problematic and do not indicate significant loading. Theoretically, the anticipated intensity of competitors is a crucial aspect of a market attractiveness (MA02\_03). Similarly, the entry barriers to a market (high investment capital or legal constraints) can be a decisive factor for the perceived market attractiveness. Thus, as suggested by Hair Jr et al. (2021), the indicators will be retained in the formatively measured constructs, even though not every indicator weight is significant.

	O.Est.	Boot.Mean	Boot.SD	T Stat.	2.5% CI	97.5% CI	$t \geq 2.576$
MA02_01 → MA	0.70	0.64	0.15	4.77	0.39	0.83	✓
MA02_02 → MA	0.87	0.81	0.12	7.40	0.60	0.95	✓
MA02_03 → MA	0.45	0.41	0.18	2.49	0.08	0.67	✗
MA02_04 → MA	-0.01	-0.02	0.22	-0.05	-0.38	0.36	✗
MA02_05 → MA	0.07	0.07	0.20	0.38	-0.24	0.39	✗
AP02_01 → AP	0.81	0.77	0.13	6.21	0.53	0.95	✓
AP02_02 → AP	0.84	0.81	0.12	6.95	0.58	0.95	✓
AP02_03 → AP	0.69	0.66	0.14	5.13	0.43	0.86	✓

Table 6.24: Indicator weights and importance assessment for formative constructs

### 6.9.6 Evaluation of the Structural Model

In the next step, the structural model can be evaluated. According to Hair Jr et al. (2021), the procedure follows a 5-step approach:

1. Assessment of collinearity issues in the structural model
2. Assessment of the significance and relevance of the structural model relationships
3. Assessment of the model’s explanatory power
4. Assessment of the model’s predictive power
5. Model comparisons

#### 1. Assessment of collinearity

As presented in table 6.25, all VIF values are clearly below the threshold of 5 and even 3. Therefore, it can be concluded that collinearity among predictor constructs is not an issue in the structural model.

	VIF	< 3
VB	1.542	✓
CB	1.647	✓
MA	1.367	✓
AP	1.639	✓

Table 6.25: Assessment of collinearity in the structural model

**2. Significance of the structural paths**

The original path coefficient estimates (O.Est) in table 6.26 for the exogenous factors show that the Personal Values- Business Idea Fit has the most substantial positive impact on the desirability of the business idea (0.52). Core Competence- Business Idea Fit and Market attractiveness have a moderate positive effect (0.20 and 0.21), and the construct Anticipated Profitability has a shallow impact on the endogenous construct DBI with 0.07. The T Stat values are analysed to assess the statistical significance of the structural paths. As mentioned above, the significance level of 5%, as previously defined in the bootstrapped model, should exceed the value of 1.960 (Hair Jr et al., 2021). VB and MA are statistically significant. However, the factor "Anticipated Profitability" has a low impact and is statistically not significant.

	O.Est.	Boot.Mean	Boot.SD	T Stat.	2.5% CI	97.5% CI	$t \geq 1.960$
<i>VB → DBI</i>	0.52	0.50	0.11	4.86	0.32	0.68	✓
<i>CB → DBI</i>	0.20	0.20	0.13	1.55	-0.01	0.42	✗
<i>MA → DBI</i>	0.21	0.24	0.10	2.18	0.09	0.40	✓
<i>AP → DBI</i>	0.07	0.09	0.10	0.72	-0.08	0.26	✗

Table 6.26: Path coefficient estimates, significance, and confidence intervals.

Next, the total effects need to be analyzed to understand the impact of the exogenous factors on the Perceived Desirability of the Business Idea. Table 6.26 presents the total effects of the constructs (O.Est). Perceived Personal Value- Business Idea fit has the most substantial effect on DBI. Therefore, the fit between personal values and the business idea should be an integral part of self-reflection and personal analysis of entrepreneurs.

**3. Assessment of the explanatory power**

The explanatory power analysis "provides information about the strength of the assumed causal relationships in a PLS path model. The primary measure for assessing a PLS path model's explanatory power is the coefficient of determination  $R^2$ " (Hair Jr et al., 2021, p. 184). For the analysis of the explanatory power, the  $R^2$  value of the endogenous construct (DBI) and the effect size  $f^2$  of the predictor constructs are used (Hair Jr et al., 2021). The  $R^2$  value of DBI (0.675) can be considered moderate (see table 6.27). The effect size of the exogenous constructs is presented in table 6.28. Here it is also evident that Perceived Personal Values- Business Idea Fit has a firm effect size (0.22) on the desirability of the business idea. There is no effect size of other constructs on DBI. As a result, it can be said that the construct VB has the most power to explain DBI in the model.



	DBI
R <sup>2</sup>	0.675
AdjR <sup>2</sup>	0.658
VB	0.524
CB	0.203
MA	0.208
AP	0.074

Table 6.27: Path coefficient estimates, R<sup>2</sup>, and adjusted R<sup>2</sup> values

	VB	CB	MA	AP	DBI
VB	0.00	0.00	0.00	0.00	0.499
CB	0.00	0.00	0.00	0.00	0.071
MA	0.00	0.00	0.00	0.00	0.105
AP	0.00	0.00	0.00	0.00	0.010
DBI	0.00	0.00	0.00	0.00	0.00

Table 6.28: f<sup>2</sup> effect sizes

#### 4. Evaluation of the model’s predictive power

According to Hair Jr et al. (2021), the predictive power of a statistical model is defined and interpreted by many researchers using the R<sup>2</sup> statistic which only indicates model’s *in-sample* explanatory power. A measure to define a model’s ability to predict new or future observations is the "Out-of-sample predictive power". A procedure to predict the out-of-sample predictive power is the "PLS-predict" developed by Shmueli et al. (2016). To decide the right metric for evaluating the predictive power, the distribution of the prediction errors is assessed (Hair Jr et al., 2021). Root-mean-square deviation (RMSE) is an appropriate metric to examine a model’s predictive power if the prediction error distributions are symmetric. Figure 6.51 presents a symmetric distribution of prediction errors which is a good indicator to use the RMSE metric. Next, researchers need to compare each indicator’s RMSE (or MAE) values with a naive linear regression model (LM) benchmark Hair Jr et al. (2021, p. 121). The following rules developed by Shmueli et al. (2019) are applied to compare the RMSE values with the LM values. Their guidelines are presented in Hair Jr et al. (2021, p. 121):

1. If all indicators in the PLS-SEM analysis have lower RMSE (or MAE) values compared to the naive LM benchmark, the model has high predictive power

2. If the majority (or the same number) of indicators in the PLS-SEM analysis yields smaller prediction errors compared to the LM, this indicates a medium predictive power
  
3. If a minority of the dependent construct's indicators produce lower PLS-SEM prediction errors compared to the naive LM benchmark, this indicates the model has low predictive power
  
4. If the PLS-SEM analysis (compared to the LM) yields lower prediction errors in terms of the RMSE (or the MAE) for none of the indicators, this indicates the model lacks predictive power

Table 6.29 presents the two indicators (DBI03\_01, DBI03\_05) of the dependent construct "Desirability of the business idea". The PLS path model indicates a lower out-of-sample predictive error (RMSE) compared to the LM model benchmark for the two indicators. As a result, it can be stated that the model has high predictive power.

PLS out-of-sample metrics		RMSE PLS < RMSE LM	
	DBI03_01	DBI03_05	✓
RMSE	1.313	1.259	
LM out-of-sample metrics			
	DBI03_01	DBI03_05	
RMSE	1.376	1.459	

Table 6.29: Evaluation of predictive power

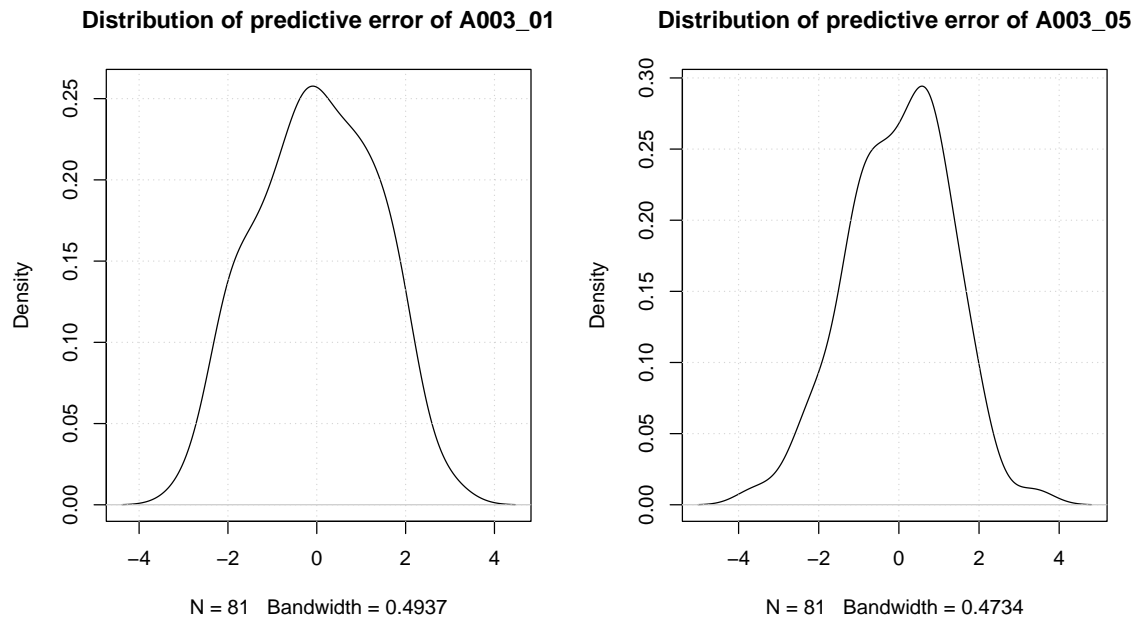


Figure 6.51: Distribution of prediction error for the DBI indicators.

In this chapter, the theoretical Ikigai framework was operationalized with four constructs. Relevant items have been compiled and adapted from existing theoretical and established models, such as the Theory of Planned Behavior by (Ajzen, 1991) and the entrepreneurial event model (Shapero and Sokol, 1982). To ensure content and construct validity, additional constructs and items have been developed and tested with students and experts. As a result of several entrepreneurship courses, a one-day opportunity recognition framework has been developed, tested, and applied with different target groups at the KIT. Finally, 69 participants participated in the evaluation and the empirical Ikigai study. Different opportunities and challenges could be identified throughout the statistical and analytical analysis. First, developing new scales requires precise scale development and testing process planning. In addition, experience in formulating the items and constructing formative or reflective measures is essential to avoid issues *after* the data collection with validity, reliability and other quality measures. As suggested by Hair Jr et al. (2021), the different analysis steps reveal that some items could be the subject of improvement or replacement in future studies. Due to poor performance, one item (CB01\_01) was identified as not reliable and removed from the model. In total, however, the empirical model performs well. Most reflective and formative constructs have significant indicators (items) with high to medium loadings. No critical issues with collinearity or convergent validity could be observed in the analytical process. The model's explanatory power with  $R^2 = 0.675$  is between moderate (0.50) and substantial (0.75) (Hair et al., 2019). Another commonly used measure for the overall quality of a structural equation model is Root Mean Square Residual (RMSR)

measure. It is used to evaluate the accuracy of a regression model. The RMSEA stands for Root Mean Square Error of Approximation and is a statistical measure used to evaluate the fit of a model to the observed data. RMSEA measures the discrepancy between the observed data and the model. It considers the number of parameters estimated in the model and adjusts for model complexity. According to Kline (2011), an RMSEA lower than 0,1 is acceptable. To test the accuracy of the PLS-SEM results, the RMSR and RMSEA were computed for the underlying model using the Confirmatory Factor Analysis (CFA) function in the lavaan package in R. It provides detailed output parameters presented in fig. E.4. It shows an RMSR value of 0.088 and an RMSEA value of 0.072. Thus, the underlying model shows acceptable results, which two different calculation approaches can confirm.

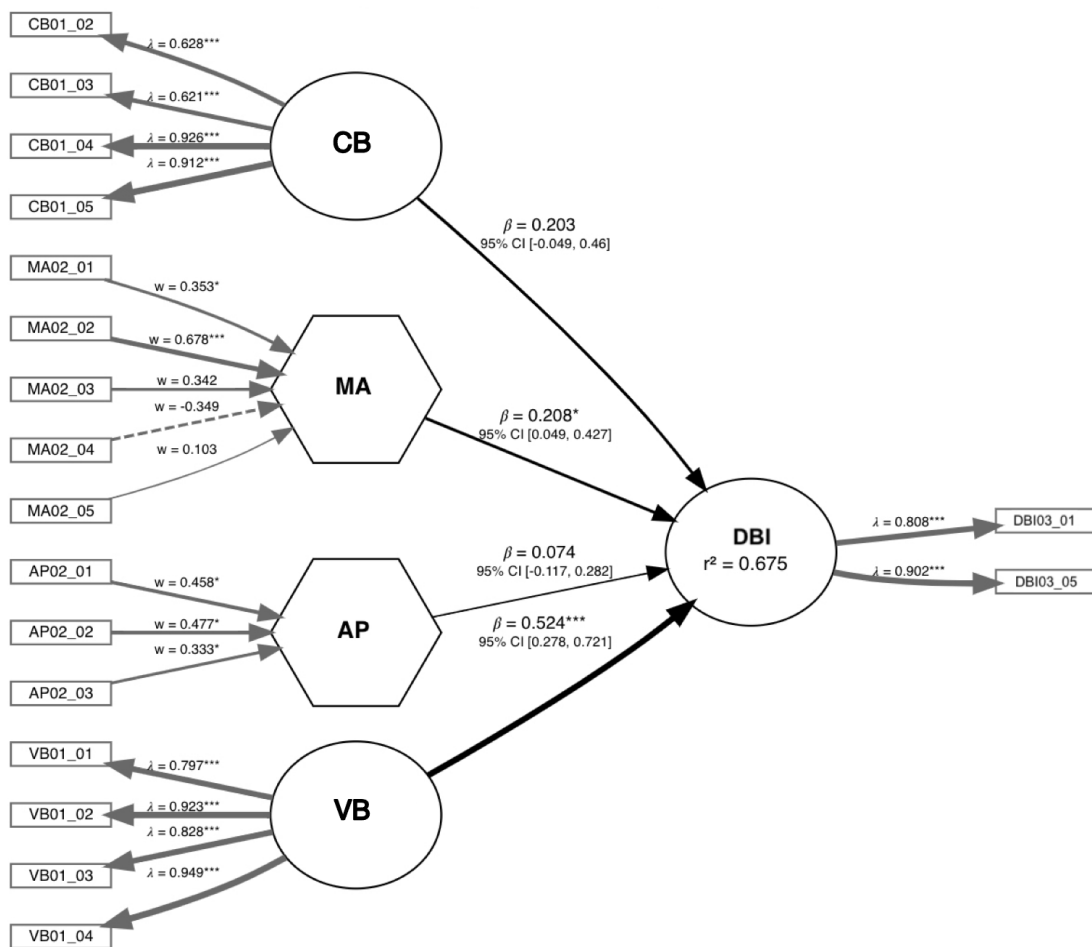


Figure 6.52: Empirically tested Ikigai Model

As a result, the desirability of the business idea (DBI) is significantly and considerably ( $0.524^{***}$ ) influenced by the perceived fit between the personal values and the business idea (VB). Moreover, the perceived market attractiveness (MA) also plays significant role ( $0.208^*$ ). The factors Anticipated Profitability (AP) and the perceived fit between the core

competences and the business idea (CB) are statistically not significant. It is questionable, however, if a larger sample would increase the significance and factor loadings and improve the overall model fit. The final empirical Ikigai model is presented in figure 6.52. An overview and results of the initial hypotheses are presented in table F.2.

Nr.	Hypothesis	Expected relation	Result
H1:	The higher the perceived market attractiveness, the higher the perceived desirability of the business idea.	Significant   Positive MA → DBI	<b>Confirmed (0.208*)</b> ✓
H2:	The higher the anticipated profitability, the higher the perceived desirability of the business idea.	Significant   Positive AP → DBI	<b>Not confirmed (0.074)</b> ✘
H3:	The higher the perceived fit between the core competences and the business idea, the higher the perceived desirability of the business idea.	Significant   Positive CB → DBI	<b>Not confirmed (0.203)</b> ✘
H4:	The higher the perceived fit between the personal values and the business idea, the higher the perceived desirability of the business idea.	Significant   Positive VB → DBI	<b>Confirmed (0.524***)</b> ✓

Table 6.30: Validation of initial hypotheses with PLS-SEM

The aim of the thesis and the underlying study was to create a course framework which will provide teaching tools, methods and pedagogical formats and enable students to develop desirable business ideas. In addition to assessing the Ikigai constructs using a PLS-SEM, a semantic differential scale (see fig. 6.25) was used to capture students' attitudes towards their business ideas developed in class. Student teams rated their business ideas based on the statements and attributes on a scale from -5 to +5. The results were aggregated on the course level and are presented in figure 6.53. As a result, it can be observed that the course participants of the Leadership Talent Academy (LTA) rated their business ideas with the lowest descriptor values. The LTA opportunity recognition workshop was conducted as a compact one-day session with Master' and PhD students. Based on the course evaluation, it can be concluded that the seminar did not reach its goal and did not provide the proper

framework to generate desirable business ideas. Time pressure, a heterogeneous target group and diverging expectations of the LTA course participants may cause the results.

The entrepreneurship seminars Startup X (Master students) and Entrepreneurship Basics (Bachelor students) show similar performance in the business idea evaluation. Teams in the Startup X seminar generated more "meaningful" ideas than bachelor students. However, the mean desirability values are relatively low. The international and interdisciplinary EPICUR Entrepreneurial Lab performed best in the evaluation. During this course, students met once a week and worked in online sessions on their business projects. In addition, student teams were supervised by trainers and got critical input from business experts from different organizations in Europe. In addition to the nine online sessions, students took part in intense supervision sessions where they could discuss and improve their assumptions and business ideas. As a result, students indicate their business ideas as meaningful, desirable, likeable and visionary. From that analysis, it can be concluded that the course framework, the target group and their course expectations, course duration and the intensity of mentoring are critical factors to influence the perceived desirability of the business ideas. In addition, a pattern in the evaluation can be observed among all courses presented in figure 6.53. Participants indicated their business ideas in most courses as less innovative or promising. However, it also can be observed that the Ikigai components contribute (more or less) to the development of meaningful, desirable and likeable business ideas.

### **6.9.7 Moderation Analysis**

In the final step, a moderation analysis is performed. The instructional design of the courses included implementing and evaluating the personal values finder developed by Benedict Hebllich (<https://www.findyourvalues.com>). As a result, students get an individual evaluation of their personal values supporting and ensuring clarity about their personal values (see the template in fig. H.2). However, the instruction to clarify the core competencies was developed over time and was not as clear and precise as the evaluation of the personal values. Starting with a brain dump and reflection exercise on their core competences, a core competence template was developed and implemented over time (see figure H.2). Therefore, it can be hypothesized that the clarity of core competences is not as homogeneous among the participants as the clarity of personal values. For that reason, the question is if the clarity about core competences can have a moderating effect on the relationship between the Core Competence- Business Idea Fit and the desirability of the business idea. To investigate the potential moderation effect, the scale in fig. 6.54 was used to define the moderator. Following the procedure described in Hair Jr et al. (2021) for the moderation effect analysis, the interaction presented in figure 6.55 was calculated and assessed. The result is presented in table 6.31. The moderation effect CB\*ClarityComp on DBI is very weak and insignificant

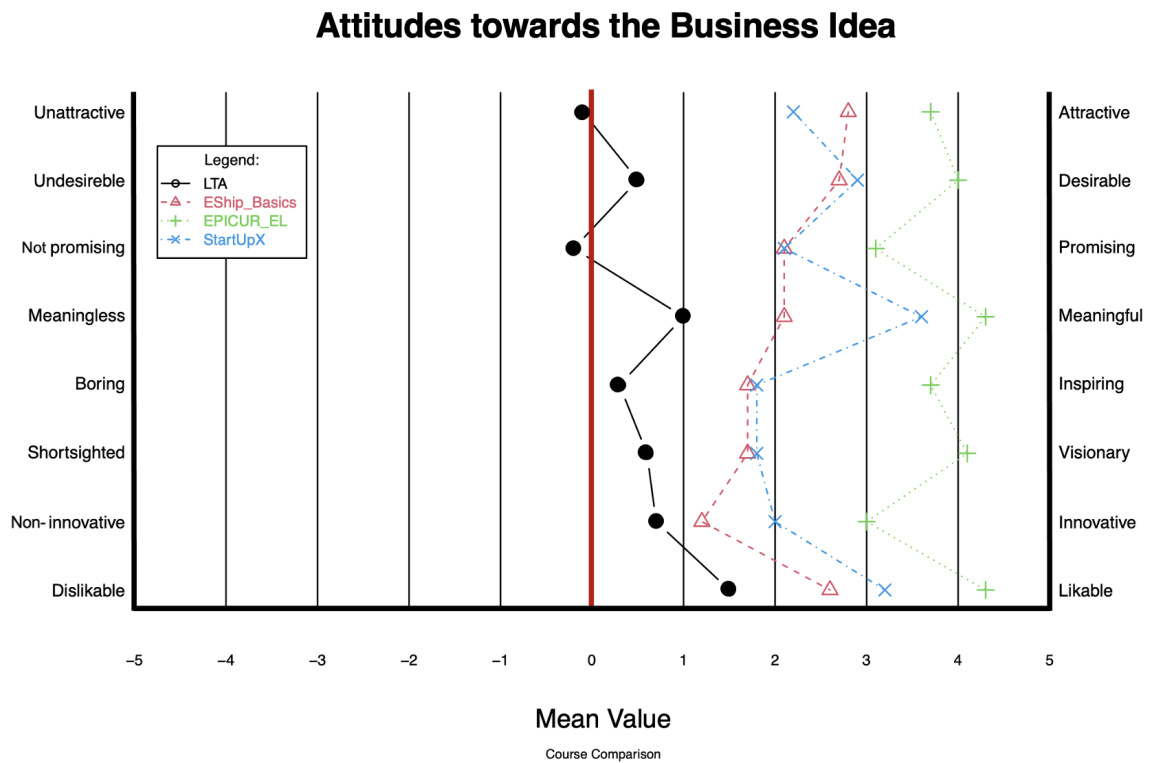


Figure 6.53: Students’ attitudes towards the business idea developed in class

(confidence intervals include 0), so further analysis and interpretation of the relationships are insufficient. To conclude, the clarity of core competences does not moderate the relationship between Core Competences - Business Idea Fit and the desirability of the Business Idea.

More insights on the relationships between the constructs and the potential confirmation of the missing moderating effects will be gathered through a qualitative study with the student teams presented in the following sections.

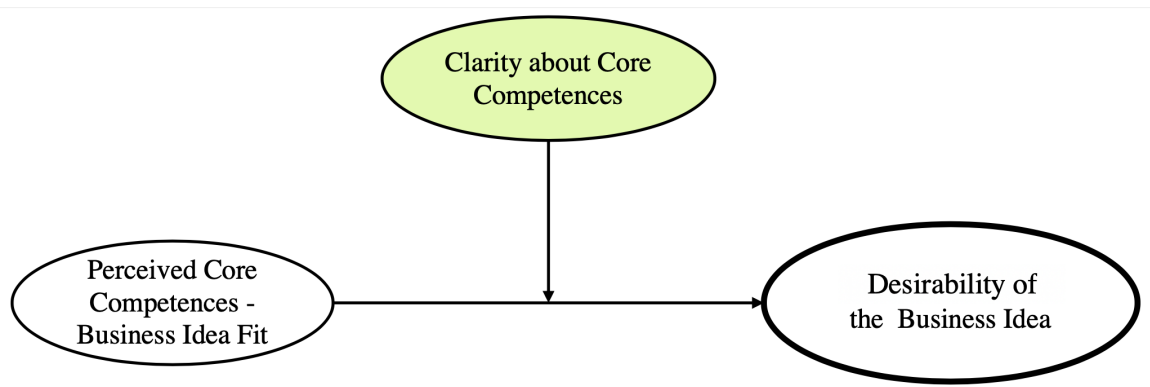


Figure 6.55: Hypothetical Model with the Moderator Effect

**Items on: Clarity on Core Competences**

Referring to your core competences, please indicate your level of agreement with the following statements from 1 (strongly disagree) to 7 (strongly agree).

ID	Item
C002_01	I know the things I am good at doing.
C002_03	I know my most developed skills.

[1 = strongly disagree; 2 = disagree; 3 = somewhat disagree; 4 = undecided; 5 = somewhat agree; 6 = agree; 7 = strongly agree]

Figure 6.54: Items on: Clarity about the Core Competences

	O.Est.	Boot.Mean	Boot.SD	T Stat.	2.5% CI	97.5% CI	Significant
VB → DBI	0.45	0.43	0.13	3.47	0.13	0.66	✓
CB → DBI	0.17	0.17	0.17	1.01	-0.19	0.50	✗
MA → DBI	0.25	0.27	0.12	2.02	0.04	0.49	✓
AP → DBI	0.13	0.13	0.13	0.98	-0.13	0.41	✗
ClarityComp → DBI	-0.05	-0.05	0.13	-0.39	-0.29	0.19	✗
CB*ClarityComp → DBI	0.05	0.13	0.12	0.38	-0.11	0.40	✗

Table 6.31: Results of the Moderation Analysis

### 6.9.8 Impressions from Qualitative Feedback

After the courses and final project presentations, course participants participated in focus group interviews. Course aspects and learning experiences were discussed in 12-39 minutes conversations. The focus group interviews were conducted in Zoom and recorded for further text and content analytical analysis with MAXQDA. 32 students from two courses took part in the focus group interviews:

- 4 Teams from Startup X Winter 2021/2 (N=17)
- 4 Teams from Entrepreneurship Basics (1) Winter 2021/22 (N=15)

Eight teams and 32 members provided their insights on key learning and main challenges and shared their ideas for course framework improvement. Unfortunately, it was impossible to consult the LTA course participants due to organizational issues. The following interview guideline was used in each team to ensure comparability and transferability of results:

- "Did you have any problems with filling out the questionnaire?"
- "What are your first thoughts when reflecting on the course <Course\_Name>?"



- "How satisfied are you with your business idea developed in the course?"
- "If you would repeat this course, what would you do to develop a promising and inspiring business idea?"
- "How could we improve the course?"
- "How did you like the application of the SDGs?"
- "What would be the hindering factor to realize the business idea?"
- "How important was the analysis of personal values and core competences?"

The first question captures any challenges with the questionnaire to ensure that the participants can understand the questions, their meaning and the wording and, based on that, provide well-reflected answers. Again, it gives a high level of validation of the instrument with the specific group of respondents. The following questions provide the opportunity to reflect on the course environment, options to improve the course framework and insights into the different course components, such as SDGs, the implementation of personal values etc. As a result of the focus group interviews, 3,5 hours of qualitative feedback was captured from the participants. The interviews were reviewed individually. Relevant parts of the interviews were transcribed to provide the text corpora for the text analysis and deductive coding. Initial categories and themes were derived from the guiding questions. Insights provided by the students not covered by the initial category system were coded inductively. Interviews with Master's students participating in the StartUp X seminar revealed more insights, and the conversations were more detailed and in-depth. On the other hand, the capacity of the Bachelor students to reflect on the seminar and the particular aspects was poor. As a result, the interviews were more superficial and shorter. This fact is represented by the number and the distribution of codes (see fig. 6.56).

### **Questionnaire**

The first question at the beginning of the interviews was if the participants experienced any challenges while filling out the questionnaire and if they understood the respective questions. As presented in figure 6.56, all groups and their members indicated no problems with the questionnaire and the specific questions to be filled out. Participants pointed out that the questions were clear and precise (StartUp X\_Opportunity: 2). Some participants from the Bachelor's course, however, found it hard to reflect on the content of the questions (EShip Basics Team 1: 2). Interestingly, one student mentioned that the reflection on the questions while filling out the questionnaire, initially made him think about the realization of the business idea. It also means that the student did not reflect on that while working on the

Nr.	Course	Team Name	Members	Duration (in min)
1	StartUp X	Opportunity	5	39:10
2	StartUp X	Market	4	29:50
3	StartUp X	Solution	4	37:02
4	StartUp X	Communication	4	33:51
5	Eship Basics	Team 1	2	12:44
6	Eship Basics	Team 2	4	29:32
7	Eship Basics	Team 3	5	14:33
8	Eship Basics	Team 4	4	20:18
TOTAL			32	215:39 (~ 3,5h)

Table 6.32: Focus Group Interviews

business idea with his team. The questionnaire can be considered an intervention since it fosters reflection and raises relevant questions. However, it was challenging for bachelor students to reflect on the questions since many did not know their plans after their studies.

### Learning Experience

Next, the teams reflected on their experience made in the seminars. In particular, students mentioned the on-site workshops and teamwork as a great experience after the corona lockdown. They were excited to meet their peers and work in groups. The location also played a significant role for the StartUp X cohort: "The room was impressive, the setting was not a normal lecture room" (StartUp X\_Solution: 6). Students also liked the structured framework and the guidance during the workshop and idea development. Generating and iterating the ideas was also mentioned by the participants. One student stressed that his most significant learning was the customer interview and the insights he gained (StartUp X\_Opportunity: 10).

### Business Idea

One of the initial goals and the underlying motivation was to create a course framework for generating desirable and inspiring business ideas. Students report that they generally like their business ideas and are satisfied with what they have developed in class. However, some participants also mentioned that they are not inspired and, therefore, not motivated to realize their business idea developed in class, although they like the idea: "It is a great idea but it does not really fit to my interests" (StartUp X\_Solution: 18). "We could have the resources to make it possible but my motivation is not there." (StartUp X\_Opportunity: 23). "Im not inspired by the product, its not visionary, its not something completely new. I wouldn't 100% support it" (StartUp X\_Communication: 12).

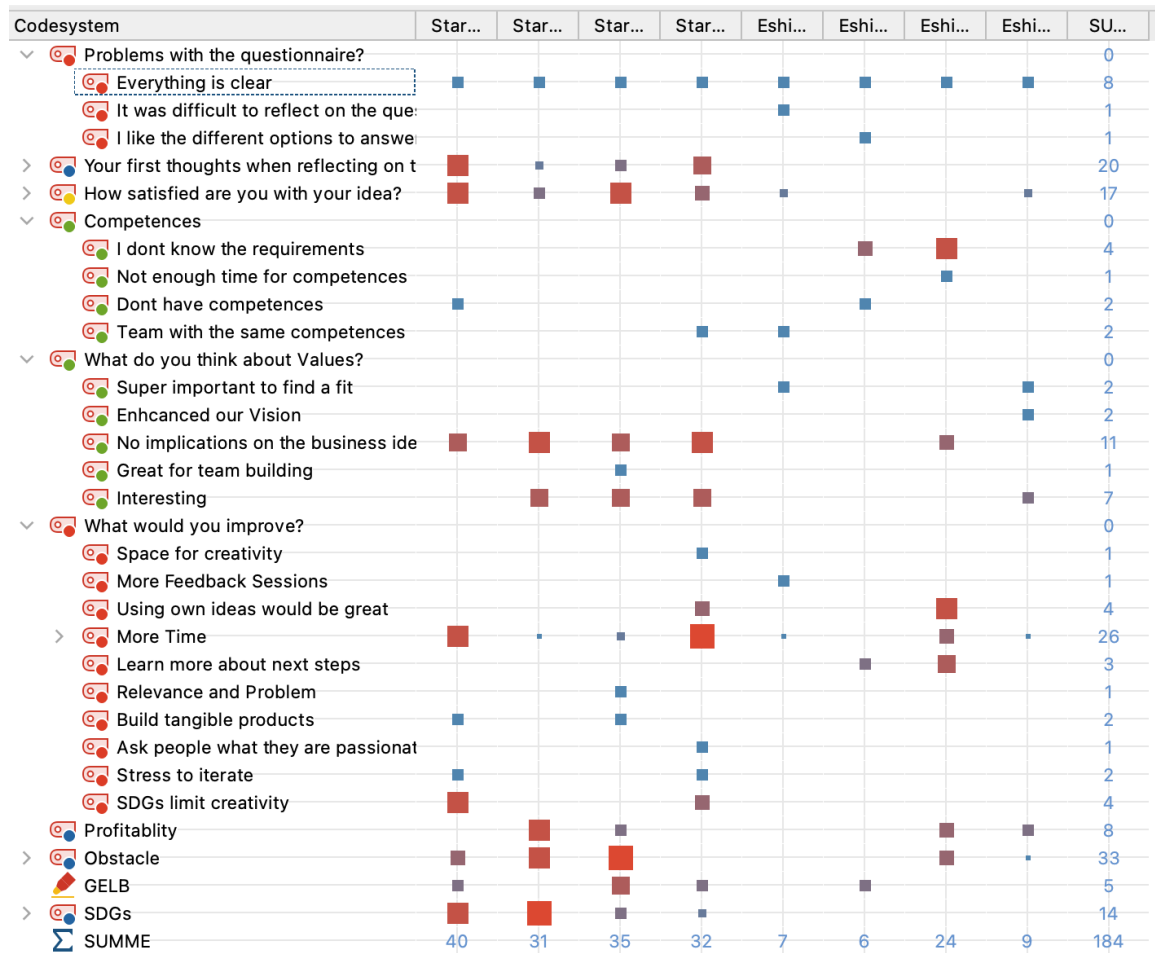


Figure 6.56: Qualitative Analysis of Focus Group Interviews

### Personal Values

Referring to personal values, which have been indicated as significantly influencing the desirability of the business idea, students agree that reflecting on and clarifying personal values is essential and was an exciting experience. However, many students report that personal values did not have an impact on the choice and configuration of the business idea: "I do not know how it (values) contributed to the later stage" (StartUp X\_Communication: 38). "For us, it was nice to have but not really important" (StartUp X\_Solution: 35). "It was fine, but I don't know if the fit was influencing the business idea (EShip Basics 2: 11). "Although this reflects my personal values, I still would say this is not so much of an interest on an entrepreneurial level" (StartUp X\_Communication: 40). On the other hand, students positively evaluate the focus on SDGs and the values: "SDGs have an influence on the idea. The idea is based on that. It also reflects my personal values, and that's why I really like the approach using the values and the SDGs. Therefore, I can identify with the idea." (StartUp X\_Solution: 22). "Now I know that we need to be aware, and I know that this is useful"

(EShip Basics 1- 2 People: 7). Initially, it was assumed that the personal values would guide the students in choosing the SDGs. However, it was not the case for some students: "I have chosen the SDG because it sounded interesting and not because it reflected my personal values" (StartUp X\_Opportunity: 44).

### **Core Competences**

Concerning the core competences, participants reported that it was difficult for them to assess the role of the competences during the focus group interviews. One of the reasons was that the students did not know the requirements for successfully realizing their specific business idea. Therefore, it was difficult to rate their core competence- business idea fit score. Some team members mentioned that since they had a group of four people with the same study background, they would not have the right and diverse set of competences to realize the business idea. "We were all very similar in our competence set, so it would be better to have a diverse set of competences for this business idea." (StartUp X\_Communication: 43-44). "The idea is great to work with our values but we have the same competences since we come from the same faculty (EShip Basics 4: 15). In addition to that, many students mentioned that there was not enough time to reflect on their core competences to get clarity on their knowledge, skills and attitudes and therefore, some participants report to have no clarity about their competences and the requirements. "Starting with the SDG, we have a good solution, but making it a reality would be difficult. We do not have resources and competences."(StartUp X\_Opportunity: 20). "I do not know if I have the competence to realize the idea. Because I do not know if I can realize the idea, what is required and also which competences I actually have (EShip Basics 3: 10-11). In general, however, students did not stress the competence part of the workshop and did not refer to it while reflecting on the effect on the business idea. The feedback and the line of discussion show evidence that both clarity about core competences and the required set of competencies to realize the business ideas were lacking and could be improved in future studies.

### **Profitability**

When reflecting on the perceived attractiveness of the business idea developed in class, students often refer to profitability and the market. A realistic chance or perspective of financial success plays a critical role in students' reflection and argumentation: "Here, I don't know how long it will take to generate first money" (EShip Basics 2: 21). "It is a huge investment and we dont have market knowledge. I'm not fully convinced about the business idea- if it would be profitable, then I would say yes" (StartUp X\_Market: 29-30). "I like the idea but what stops me is the question if this is really profitable" (StartUp X\_Solution: 25).

## **Impediments**

Therefore, the question is which other obstacles the students see in the potential realization of the business idea. With regard to the challenges, students report the lack of expertise needed in specific industries and on the markets. Therefore, they can not assess the feasibility of the business idea properly. The entry barriers and access to the resources are also mentioned as one of the main obstacles: "The barriers are too high" (StartUp X\_Market: 13). "For me, it is the entry barrier that stops me from doing this" (StartUp X\_Market: 31). "The entry barriers are high but I am very satisfied with the idea" (StartUp X\_Market: 12). "I don't know how to realize the idea because it has technological aspects and we also need the resources (batteries). I am uncertain if I want to realize that idea." (StartUp X\_Solution: 23). Profitability was mentioned as another key obstacle influencing the intention to realize the business idea: "Our idea takes longer than the conventional idea to know if it's working or not, so it is not my first choice" (StartUp X\_Opportunity: 24). "I'm not fully convinced about the business idea- if it would be profitable, then I would say yes" (StartUp X\_Market: 30). "We should better understand the profitability" (EShip Basics 2: 24).

## **How to improve the course**

Finally, the teams discussed improving the course to create better business ideas worth realizing. Interestingly, students want more time to gain in-depth knowledge to estimate profitability, customer segments, competitors and markets, understand the problem space, and develop solutions. In addition, they want to learn tangible products that would motivate them to realize their business ideas: "I would try focusing on hardware" (StartUp X\_Opportunity: 30). "I would love to develop a tangible product with value contribution. Our idea is a service, and I am missing the product feature." (StartUp X\_Solution: 47-48). Also, the introduction to the SDGs was attractive to most of the student participants. However, many reported that working on the SDGs has limited their creativity to develop business ideas they want to realize: "SDGs did not help us. I cannot believe that the SDGs do help entrepreneurs to find a business idea" (StartUp X\_Opportunity: 49). Using own ideas would be preferable for the students: "In my view, it would be even better to follow own ideas, because they are more feasible. The SDG-based ideas are complex and challenging (EShip Basics 2: 15). At this point, it needs to be mentioned that the development of the course framework was initialized by the observation and the fact that student-based ideas often lack feasibility and, therefore, desirability. Coming back to student-based ideas would result in the same problem.

The most often mentioned requirement was more time for in-depth analysis. The ideation phase in both courses, StartUp X and Entrepreneurship Basics, was designed as a one-day workshop. At the end of the first workshop day, students had an initial idea based on the

analysis of the SDGs. It was also mentioned and stressed that one of the key entrepreneurial activities is to learn from the customers and the markets and, therefore, to iterate the business ideas until they are viable. Also, the StartUp X road map visualization indicates the iterations and feedback loops teams can and should perform in the initial opportunity and solution districts. Nevertheless, many teams followed the initial ideas developed in the first session without critically assessing, challenging and iterating on the solution. Students also required creativity sessions since the current framework did not include a dedicated creativity session. The following key aspects were mentioned concerning how to improve the course:

- More time on ideation
- Better estimate the profitability
- Better understand the problem
- More time on competitor analysis
- More guidance on estimating the market size
- More time for Opportunity Recognition
- Develop own, not SDG-based ideas
- More methods for dedicated creativity sessions
- More information about the "next steps" and options for realizing the business idea.

### **6.9.9 Discussion**

In the previous sections, the traditional Ikigai framework was introduced and described as a potential and valuable framework for entrepreneurship. The framework was operationalized to provide empirical evidence of its effect on students in entrepreneurship education courses, and four constructs were defined. Based on that, the items were developed and validated in an iterative process. As a result, the questionnaire was developed to capture relevant data from the course participants. Based on that, a course framework for an opportunity recognition workshop was designed, including teaching methods, learning objectives and evaluation tools. In 12 iterations, the framework was developed, tested and improved in different formats, target groups and settings. Finally, four courses could be evaluated using a survey. The data analysis was performed with a PLS-SEM. Using a mixed method approach, the quantitative data and statistical results were contrasted with qualitative insight from focus group interviews with the teams. The following sections will discuss the results of the statistical analysis and the qualitative insights.

### Assessment of the Questionnaire

To capture and operationalize the four Ikigai guiding questions, the questionnaire was iteratively developed and tested with experts and students. The validation procedure has yielded satisfactory results. The operationalization reflects the underlying Entrepreneur-Opportunity Nexus by referring to a fit between person-related dimensions (personal values and core competences) and market-related dimensions (market attractiveness and profitability). The precise conceptualization and the development of valid and reliable scales is a critical process in social science. For that reason, the questionnaire was developed and pretested in two iterations. The items' relevance (Expert rating) and clarity (Student rating) were assessed in the pretest. The scales were modified and optimized with each new feedback from the experts and students. As a result, the scales fulfilled the validity criteria on item and scale levels. The analysis of the items in section 6.9.4 shows satisfactory results. After reviewing additional quality indices of the scales and the items, some items were removed from the analysis. Particular attention was paid to conceptualizing the formative and reflective constructs and their underlying items. To have a clear conceptualization, that meets the criteria presented in table 6.14, some initial items were dropped, resulting in a clear conceptual formative or reflective set of factors.

The reliability and validity measures of the constructs and items show good results. However, the assessment of convergent validity of formative constructs market attractiveness (MA) and anticipated profitability (AP) in table 6.21 indicates poor performance. On the one hand, the constructs might be too similar, so it is difficult for the respondents to distinguish between the concepts clearly. On the other hand, a single-item approach was applied according to Hair Jr et al. (2021) to assess the convergent validity. Therefore, it is possible that the choice of a single-item measure was not appropriate. The evidence from the focus group interviews is that the relevance of market attractiveness and anticipated profitability plays a crucial role in assessing the business idea's attractiveness, desirability and, potentially, the intention to realize the business idea. However, many teams on the bachelor and master levels had significant problems in assessing the dimensions within the course. Clear evidence and dedicated exercises on market size, future growth, and profitability would benefit the evaluation and help students evaluate the business potential's attractiveness and, therefore, better indicate their level of desirability of the business idea. At the same time, the question can be raised if the market attractiveness and anticipated profitability are the appropriate representation of "What the world needs" and "What you can be paid for". The personal values quest helped participants reflect on and identify their values. As a result, the graphical evaluation of the questionnaire was one of the course outcomes. A second version of the Ikigai questionnaire and the opportunity recognition intervention should also include and capture the respondents' *clarity* about what the world

needs and what you can be paid for. A dedicated analysis could be developed to provide guidance and clarity on that topics.

Regarding the core competences, it was assumed that the course participants would have clarity and know their top three core competences after the dedicated exercises. Different instructions were introduced to gain clarity (e.g., self-reflection, 360-degree feedback). However, the qualitative analysis of the focus group interviews indicated a lack of clarity about the core competences among many students. For that reason, an additional question could be integrated into a second version of the questionnaire to note down the top three competences. That would initialize the reflection process of the students about their relevant knowledge, skills and attitudes. In addition, questions relating to the competence set required for a successful realization of the business idea would be beneficial since many students were unsure about the competences needed for the business idea.

In conclusion, the Ikigai questionnaire is a good starting point for operationalizing and capturing the main dimensions of the original Ikigai framework and the entrepreneur-opportunity nexus. The Value Finder is an appropriate tool to clarify personal values and assess the personal values- business idea fit. To ensure clarity about the core competences, a dedicated intervention and time for reflection and discussion will be beneficial. On the other hand, in assessing the core competences- business idea fit, a list of required competences is needed that will lead to a successful realization of the business idea. With that background, the students can better assess the core competence- business idea fit. As discussed above, market attractiveness and anticipated profitability can be re-conceptualized, and the clarity about the current and future demands (what the world needs) can be elaborated on in a dedicated session.

### **Assessment of the Opportunity Recognition Workshop**

The Opportunity Recognition workshop is presented in figure 6.30, and table 6.9 was assessed in a pre-study and the main study. The main components of the workshop are the analysis of personal values and core competences, the introduction and analysis of the Sustainable Development Goals, the identification of needs and problems and the ideation, assessment and selection of potential business solutions. The evaluations indicate good performance results. The LQI of StartUp X and Entrepreneurship Basics is 100. The impressions of the first sessions in StartUp X are reflected in the results of the focus group interviews.

The course participants report that the course has a clear structure that helps them to follow the steps to come to a result and deal with unstructured information and uncertainty. For many students, introducing and analysing the SDGs is a great challenge. Dealing with broad and general topics (e.g. Zero Hunger) requires an in-depth analysis of documents



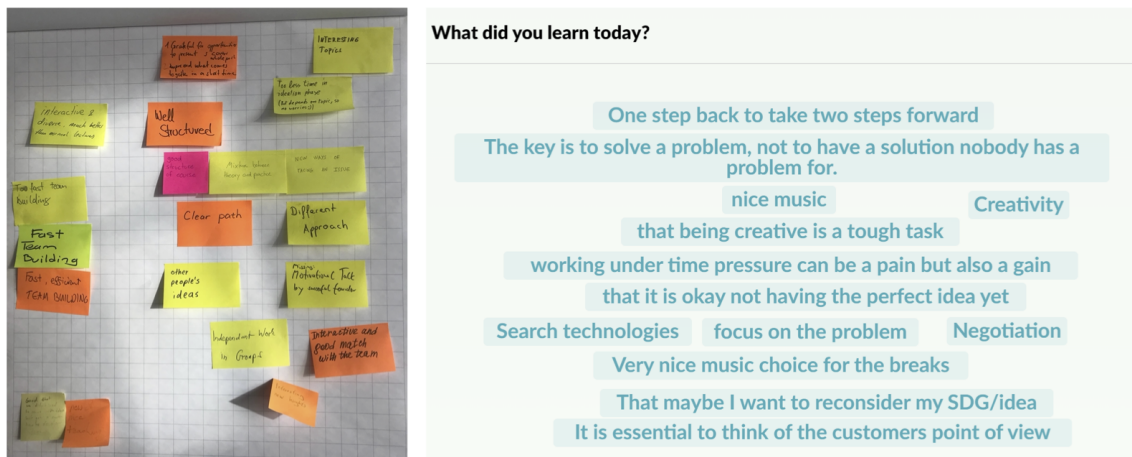


Figure 6.57: Impressions from the Opportunity Recognition Workshop

presented in the class, statistics, figures and relevant information. That analytical and cognitive process is often time-consuming and requires analytical skills and critical thinking. Within the one-day workshop, it was not easy to get an overall and clear picture of the current and future situation regarding the specific SDG. In addition to that, students report that the SDGs limit their creativity because they can not work on their business ideas. In the course introduction, the trainer explained the role of the SDGs (problem space) and highlighted that students with their own ideas could implement their ideas into the SDG framework and use it as inspiration to enhance creativity and the ideation process. However, many teams in the Bachelor and Master courses did not iterate on the idea and were "stuck" with the initial idea and the SDG topic. The introduction of the SDG has another critical component in entrepreneurship education and education at the university in general. Many students did not know about the SDGs before and did not have a chance to learn about the key problems and challenges of our world and societies. For that reason, working with the SDGs also had a normative approach. Students should know about the key problems and have the chance to take responsibility and action for people and the planet.

In StartUp X, course participants also mentioned that it was great to listen to different lecturers covering their topics of expertise. That showed a great involvement of the teaching staff and motivated the course participants. The integration of mentors and jury members in the final pitch event was also crucial. Some course participants changed their perception of the business idea after receiving positive and motivating feedback from a jury member. After that, the team started to reflect on the option to work on the business idea after studies.

In summary, the opportunity recognition workshop can potentially be developed as an independent 2-3 day workshop including relevant topics such as ideation, creativity, problem identification, market analysis, and profitability estimation. After that, the business development can be performed in subsequent sessions. However, in the current organizational

setting at the KIT and the established course frameworks for StartUp X and Entrepreneurship Basics, time for such in-depth interventions and programs is missing. Future work can be done to create a dedicated 3 ECTS workshop on Opportunity Recognition, including topics mentioned by the course participants presented above.

### **Assessment of the Empirical Ikigai Model**

The detailed assessment of the theoretical model is presented in section 6.9.3. The originality of this study resides in empirical testing of the Ikigai model in entrepreneurship education. The empirical model is presented in figure 6.52. It was developed and assessed based on the guidelines presented by Hair Jr et al. (2021) and has an explanatory power ( $R^2$ ) of 0.675, indicating a satisfactory value. As a reference, Linan reports in his studies (Liñán, 2004; Liñán and Chen, 2009) the explanatory power with 47.3% and 55.5% of the variance in entrepreneurial intention. He also mentions that most of the linear models "typically explain less than 40%" (Liñán and Chen, 2009, p. 607).

The initial hypotheses were based on the assumption that the Ikigai components, which include what you love, what you are good at, what the world needs, and what you can be paid for, can affect the perceived desirability of a business idea by providing a framework for evaluating the potential success (external view) and fulfilment (internal) of the idea and thus, strengthen the Entrepreneur-Opportunity Nexus. If a business idea aligns with all of these components, it may be seen as highly desirable as it incorporates elements of passion, competences, and financial viability. Conversely, if a business idea does not align with these components, it may be seen as less desirable. Based on the findings presented in the section 6.9.3, the support for two critical factors (Market Attractiveness and Personal Values-Business Idea Fit) influencing the perceived desirability of a business idea can be claimed. Therefore, nascent entrepreneurs and entrepreneurship educators should consider the factors in developing business ideas within and outside academic programs to help students and entrepreneurs to create desirable business ideas.

Interestingly, anticipated profitability and the competence-business idea fit do not have a statistically significant impact. In his study, Liñán (2004) found out that knowledge has a high relevance and direct influence not only for other antecedents of intention but also for intention itself. Especially, knowledge showed a great influence (17.2 % of the variance) on perceived feasibility. Because students have less clarity about their core competences and the requirements to successfully realize the business idea, knowledge (clarity about core competences and the requirements) could be a decisive factor in that study.

Segal et al. (2005, p. 47) view the decision to become an entrepreneur as a three-part process in which (among others) "Individuals assess whether they possess the requisite knowledge, skills, and abilities to perform the tasks and activities necessary to become an

entrepreneur." Similarly, the clarity about the anticipated profitability could also be improved in future studies and pedagogical settings. In their qualitative feedback, students did not refer to the core competences analysis results and their impact on the business idea. Instead, students mentioned that as a team, they might not have the right competences since they share the same study background and do not have much prior experience.

Referring to the initial question: "Ikigai- Traditional approach for modern entrepreneurship?" it can be concluded that the Ikigai framework can play a critical role in entrepreneurship education, support, and practice. Considering the limitations and conditions of the study presented above, the results indicate that Ikigai-based business ideas may be meaningful, desirable, and likeable. Realizing and working on meaningful business ideas will help entrepreneurs to maintain motivation and persistence and potentially contribute to a higher success rate in new venture creation.

However, the qualitative study results in chapter 5 and the conceptual paper by Shepherd et al. (2021) prove that modern entrepreneurship also requires access to critical (tangible and intangible) resources for idea implementation. The idea will never be implemented without essential resources vital to its realization. Thus, it is proposed to include an additional, important component into the traditional Ikigai framework to serve as a framework for modern entrepreneurship: "What do you have at hand?" (see fig. 6.58). This component should be scientifically examined in an integrated Ikigai framework for entrepreneurship with more significant students or entrepreneur samples in future studies.

## **6.10 Outlook and Limitations**

As with every other investigation, the underlying study has its limitations. A first attempt has been made to operationalize the Ikigai framework and find appropriate constructs to represent the four Ikigai guiding questions and items to represent and capture the dimensions of the constructs. The factors "Market Attractiveness" and "Anticipated Profitability" proved critical in the analysis and the business idea evaluation. However, they should be re-conceptualized in future studies to improve the measurement performance and representation of "What the world needs" and "What you can be paid for". In addition, large sample size is needed to make accurate and statistically robust analyses and predictions of the constructs and variables. The PLS-SEM method was chosen to meet the challenge of a small sample size and still produce reliable and valid results. In addition to that, it allows using formative and reflective measurements at the same time. However, a bigger sample size would contribute to the generalizability of the research outcomes. Also, a CB-SEM approach could be used, which, in some cases, is reported to be more accurate (Rigdon et al., 2017). An experimental setting would help conduct a course framework using

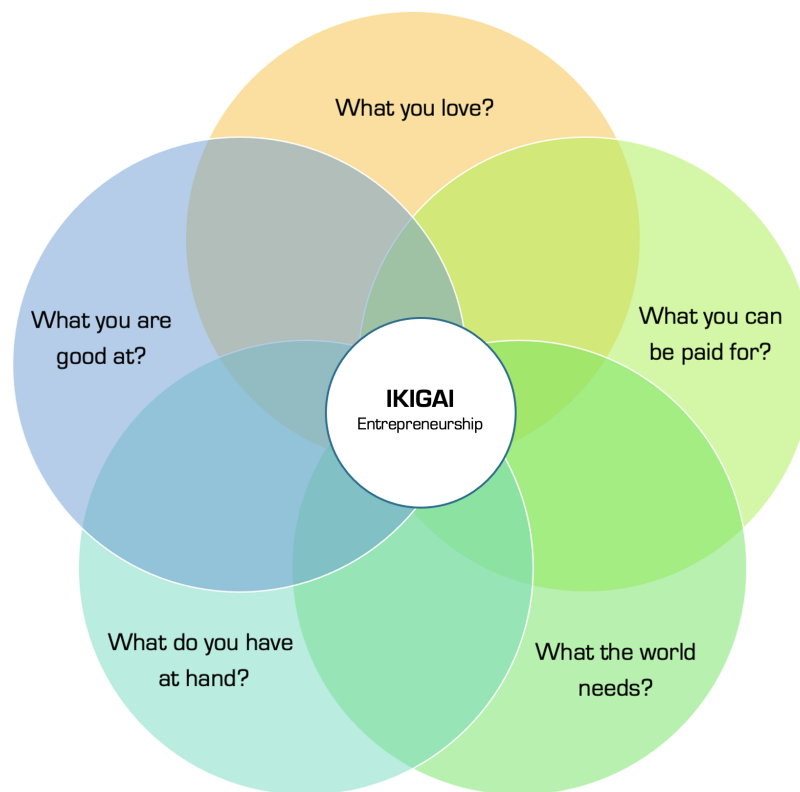


Figure 6.58: Ikigai framework for entrepreneurship. Recommendation for future studies

a standardized intervention with 150-300 participants. In addition, a G-Power definition should be performed beforehand to define the required sample size for group comparison and t-test.

Two formative and three reflective constructs have been developed and used to measure the structural model. In the next iteration of the Ikigai evaluation, Market Attractiveness and Anticipated Profitability could be conceptualized reflectively using homogeneous constructs. The assessment and measurement of the theoretical model would benefit from an experimental AB test. With that setting, the effectiveness and influence of the Ikigai components could be evaluated and tested more precisely. Using a standard and established Ikigai questionnaire, future studies could be developed across national and international institutions which provide entrepreneurship education and, as a result, develop innovative business ideas. With such an instrument, the effects of interventions and potential cultural and regional differences could be detected and revealed. Dedicated analytical sessions can be developed to enable students to do a in-depth market research to gain clarity about the market conditions to assess the market attractiveness.

Based on the workshop participants' feedback, the SDGs' implementation can be considered a limiting factor for creativity and the development of innovative products. In the subsequent workshop iterations, other approaches to developing a business idea should be

explored and compared to the results and outcomes of the entrepreneurial intention and perceived desirability scores. In addition, more time, dedicated workshops and exercises for market analysis, financial planning, and profitability estimation would help assess the viability of the business ideas. Also, the current workshops did not have specific instructions for a creativity session to ideate on innovative business solutions. Future workshops would benefit from a dedicated creativity workshop within the opportunity recognition framework.

In summary, the underlying and, to the author's knowledge, the first conceptualization of the traditional Ikigai framework serves as a good starting point to explore the effects and opportunities provided by the framework for entrepreneurship educators and nascent entrepreneurs. However, more research is needed to find appropriate and reliable constructs and indicators representing the main idea of Ikigai.



# Appendix A

## Entrepreneurial competences

### A.1 List of entrepreneurial competences derived from the qualitative study

Nr.	Entrepreneurial Competence	EC Framework	Expert Interview
1	Sell your products and services	✓	✓
2	Develop innovative products	✓	✓
3	Develop financial plans	✓	✓
4	Develop strategies	✓	✓
5	Develop a marketing strategy	✓	✓
6	Manage customers	✓	✓
7	Develop an organization	✓	✓
8	Prepare a business plan	✓	✓
9	Manage human resources	✓	✓
10	Set business goals	✓	✓
11	Delegate tasks	✓	✓
12	Organize processes	✓	✓
13	Develop organizational culture	✓	✓
14	Coordinate	✓	✓
15	Develop a team	✓	✓
16	Acquire financial resources	✓	✓
17	Take risks	✓	✓
18	Communicate	✓	✓
19	Pitch and present your ideas	✓	✓

*Continued on next page*

Table A.1 – *continued from previous page*

<b>Nr.</b>	<b>Entrepreneurial Competence</b>	<b>EC Framework</b>	<b>Expert Interview</b>
20	Lead your team	✓	✓
21	Persuade	✓	✓
22	Exchange knowledge	✓	✓
23	Work in a team	✓	✓
24	Use and develop networks	✓	✓
25	Negotiate	✓	✓
26	Train your team	✓	✓
27	Acquire knowledge	✓	✓
28	Inspire and motivate others	✓	✓
29	Solve problems	✓	✓
30	Act ethically correct	✓	✓
31	Make appropriate decisions	✓	✓
32	Act in a creative way	✓	✓
33	Act responsibly	✓	✓
34	Generate ideas	✓	✓
35	Identify opportunities	✓	✓
36	Research and analyze the market	✓	✓
37	Develop a vision	✓	✓
38	Implement ideas	✓	✓
39	Assess own strengths and weaknesses	✓	✓
40	Deal with complex information	✓	
41	Create empathy	✓	
42	Take initiative	✓	
43	Think conceptually	✓	
44	Think logically	✓	
45	Control	✓	
46	Administrate	✓	
47	Design products and services	✓	
48	Maneuver in the industry	✓	
49	Monitor the work of others	✓	
50	Plan processes	✓	
51	Prepare a competitor analysis	✓	
52	See the big picture	✓	
53	Cooperate and Collaborate	✓	

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*LIST OF ENTREPRENEURIAL COMPETENCES DERIVED FROM THE  
QUALITATIVE STUDY*

Table A.1 – *continued from previous page*

Nr.	Entrepreneurial Competence	EC Framework	Expert Interview
54	Deal with social customs	✓	
55	Seek and analyze unstructured information	✓	
56	Define your goals	✓	
57	Take actions to overcome risks	✓	
58	Validate customer needs		✓
59	Validate your business idea		✓
60	Use methodological knowledge		✓
61	Set organizational goals		✓
62	Manage projects		✓
63	Manage organizational growth		✓
64	Plan market entry		✓
65	Create value		✓
66	Develop a business model		✓
67	Use and apply technology		✓
68	Deal with uncertainty		✓
69	Solve conflicts		✓
70	Persevere		✓
71	Motivate yourself		✓
72	Deal with failure		✓
73	Reflect		✓
74	Take feedback		✓
75	Think critically		✓
76	Act efficiently		✓
77	Act independently		✓
78	Act trustworthy		✓
79	Attract customers		✓

Table A.1: List of entrepreneurial competences (sualitative study)

## A.2 Definitions in the field of Opportunity Recognition

Terminology	Definition	Source
Entrepreneurial Opportunity(ies)	An opportunity may be the chance to meet a market need (or interest or want) through a creative combination of resources to deliver superior value.	Ardichvili et al. (2003, p. 108)
	(...) a situation in which a person can create a new means-ends framework for recombining resources that the entrepreneur <i>believes</i> will yield a profit	Shane (2003, p. 18)
	Entrepreneurial opportunities are those situations in which new goods, services, raw materials, and organizing methods can be introduced and sold at greater than their cost of production.	Casson (1982) in Shane and Venkataraman (2000, p. 220)
	(...) positive and favorable circumstances leading to entrepreneurial action.	George et al. (2016, p.310)
	(...) opportunity as a favorable combination of endogenously shaped and exogenously given circumstances that make it both desirable and feasible for the entrepreneur to exploit a venture concept and to introduce a potentially value-adding offering into the marketplace.	Vogel (2017, p. 8).
	Opportunity is a juncture where something favorable can be realized through undertaking certain activities to realize the identified potential, based on a set of ideas and beliefs that enable the creation of goods and services that do not yet exist.	Hunter et al. (2013)
	A time, juncture, or condition of things favorable to an end or purpose, or admitting of something being done or effected.	Oxford Dictionary Online

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Table A.2 – *continued from previous page*

<b>Terminology</b>	<b>Definition</b>	<b>Source</b>
	An entrepreneurial opportunity, therefore, consists of a set of ideas, beliefs and actions that enable the creation of future goods and services in the absence of current markets for them.	Sarasvathy et al. (2003, p. 142)
	An opportunity is an idea or dream that is discovered or created by an entrepreneurial entity and that is revealed through analysis over time to be potentially lucrative.	Short et al. (2010, p. 55)
	An opportunity is the possibility of introducing a new product to the market at a profit.	Found by the study Hansen et al. (2011, p. 292)
	An opportunity is a situation in which entrepreneurs envision or create new means ends frameworks.	Found by the study Hansen et al. (2011, p. 292)
	An opportunity is an idea that has developed into a business form	Found by the study Hansen et al. (2011, p. 292)
	An opportunity is an entrepreneur's perception of a feasible means to obtain/achieve benefits.	Composite definition Hansen et al. (2011, p. 292)
	An opportunity is an entrepreneur's ability to create a solution to a problem	Composite definition Hansen et al. (2011, p. 292)
	An opportunity is the possibility to serve customers differently and better	Composite definition Hansen et al. (2011, p. 292)

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Table A.2 – *continued from previous page*

<b>Terminology</b>	<b>Definition</b>	<b>Source</b>
	In very broad terms, we can define the entrepreneurial opportunity as the ability to identify or develop an idea for a new product or service, and to transform it into a valuable and profitable business concept. Léger-Jarniou and Tegtmeier (2017, p. 1)	
	Opportunities are courses of action that seek to derive benefits from these changes	Grégoire et al. (2010, p. 415)
Opportunity related process	A cognitive process of recognizing an idea and transforming it into a business concept ("Opportunity development")	Composite definition Hansen et al. (2011, p. 292)
	(...) The process of recognizing opportunities as efforts to make sense of signals of change (e.g. new information about new conditions) to form beliefs regarding whether or not enacting a course of action to address this change could lead to net benefits (for instance, in term of profits, grows, competitive jockeying, and/or other forms of individual or organizational gains).	Grégoire et al. (2010, p. 415)
	A process of scanning or being alert ("Opportunity scanning/Alertness")	Composite definition Hansen et al. (2011, p. 292)
	A cognitive process of matching supply and demand ("Opportunity matching")	Composite definition Hansen et al. (2011, p. 293)
	Perception of a felt need ("Need perception")	Composite definition Hansen et al. (2011, p. 293)

*Continued on next page*

Table A.2 – continued from previous page

Terminology	Definition	Source
	A creative process of generating new alternatives ("Opportunity creating")	Composite definition Hansen et al. (2011, p. 293)
	A special case of problem solving ("Problem solving") Hansen et al. (2011, p. 293)	
	Perceiving a possibility to profitably create a new business or improve an existing one ("Business possibilities")	Composite definition Hansen et al. (2011, p. 293)
	A process of social construction within a window of time ("Social construction")	Composite definition Hansen et al. (2011, p. 293)
	Opportunity recognition—one of the central ideas of entrepreneurship—is the ability to identify a good idea and transform it into a business concept that adds value and generates revenues. Lumpkin and Lichtenstein (2005, p. 457)	

### A.3 Analysis of definitions

<b>Element</b>	<b>Frequency</b>
Entrepreneur	14
Situation/external Environmental Conditions	13
Possibility (Feasibility)	13
Product	12
New/Novelty	12
New Business Form	12
Internal Value/Profit	10
Market need/Demand	8
Introduce	8
Resources	8
Cognitive Connections/Create New Means-Ends Frameworks	7
Cognitive Processes (Recognize, Perceive, Identify, etc.)	6
Information	4
Action	4
Creative Process/Creativity	4
Value to the Market	4
Idea/Business Idea	3
Future	3
Objective/Subjective	3
Progression of Development	3
Problem Solving	2
Improve	2
Unexploited	2
Unexpected	1
Business Concept	1

Table A.3: Elements identified in the definitions of Entrepreneurial Opportunity. Hansen et al. (2011)

# Appendix B

## Compilation of Items

### B.1 Items on Entrepreneurial Intentions

Items	Author
<i>Indicate your level of agreement with the following statements from 1 (total disagreement) to 7 (total agreement)</i>	Liñán and Chen (2009)
I'm ready to make anything to be an entrepreneur	
My professional goal is becoming an entrepreneur	
I will make every effort to start and run my own firm	
I'm determined to create a firm in the future	
I have very seriously thought in starting a firm	
I've got the firm intention to start a firm some day	
<i>How likely is it that you will start a new firm of your own or with friends? Please assess the option of starting a different types of firms using the scale below (1= not likely at all to 5= already started a firm)</i>	
Start a firm on a full-time basis within one year from now	Autio et al. (2001)
Start a firm on a full-time basis within five years	
Start a firm on a part-time basis within one year from now.	
Start a firm on a part-time basis within five years.	

*Continued on next page*

Table B.1 – *continued from previous page*

Items	Author
<i>Thinking of yourself, how true or untrue is it that you</i> <sup>1</sup>	Thompson (2009)
Intend to set up a company in the future	
Plan your future carefully*	
Read business newspapers*	
Never search for business start-up opportunities (R)	
Read financial planning books*	
Are saving money to start a business	
Do not read books on how to set up a firm (R)	
Plan your finances carefully*	
Have no plans to launch your own business (R)	
Spend time learning about starting a firm	
<i>Entrepreneurial intent (5=extremely likely, 1=extremely un-likely)</i>	Shook and Bratianu (2010)
How likely is it that you will start your own business sometime in your life?	
How likely is it that you will start a firm on a full-time basis sometime in your life?	
<i>(5=strongly agree, 1=strongly disagree)</i>	
I am considering starting my own business some day in the future.	

Table B.1: Items for Entrepreneurial Intention used in the literature

## B.2 Items on Perceived Behaviour Control

<sup>1</sup>The items used in (Thompson, 2009, p. 680) "appeared as a single block in the order given. Those marked with an asterisk are distracter items that act as red herrings and are not to be included in scale analyses. Items marked (R) are reverse coded in scale analyses. Interval measure runs 1 = very untrue, 2 = untrue, 3 = slightly untrue, 4 = slightly true, 5 = true, 6 = very true. The scale's Cronbach's alpha coefficient of internal reliability proved to be .89; hence, the scale seemed to have acceptable internal reliability".



Items	Author
For me to... would be very easy- very difficult	(Ajzen, 2002, p. 670)
If I want to I will easily be able to ...	
The number of external influences that may prevent me from...	
How much control do you think you have over your ability to...	
For me to... is extremely difficult- extremely easy...	
How much control do you have over...	
If I wanted to I could easily...	
For me... would be difficult - easy	
How much control do you think you have over ...	
How much do you feel that whether... is beyond your control	
If I wanted to, I could easily...	
For me... would be difficult-easy	
I could easily... if I wanted to	
How much control have you over...	
I am confident that I would succeed if I started my own business	Autio et al. (2001)
It would be easy for me to start my own business	
To start my own business would probably be the best way for me to take advantage of my education	

Table B.2: Direct Measures of Perceived Behavioural Control (excerpt). Source: (Ajzen, 2002, p. 670)

### B.3 Items on Self-Efficacy

Items	Author
For me to...is very difficult- very easy	(Ajzen, 2002, p. 673)
If I wanted to, it would be easy for me to...	
For me...is very difficult-very easy	
I am certain that I can...	
I believe I have the ability to...	
How confident are you that you will be able to...	
I believe I have the ability to...	
To what extent do you see yourself as capable of...	

Table B.3 – *continued from previous page*

<b>Items</b>	<b>Author</b>
For me to... would be easy difficult	
How certain are you that you could...	
I will be able to achieve most of the goals that I have set for myself.	(Chen et al., 2001, p. 79)
When facing difficult tasks, I am certain that I will accomplish them.	
In general, I think that I can obtain outcomes that are important to me.	
I believe I can succeed at most any endeavor to which I set my mind.	
I will be able to successfully overcome many challenges.	
I am confident that I can perform effectively on many different tasks.	
Compared to other people, I can do most tasks very well.	
Even when things are tough, I can perform quite well.	

Table B.3: Direct Measures of Self-Efficacy (excerpt). Source: (Ajzen, 2002, p. 673) and (Chen et al., 2001, p. 79)

## B.4 Items on Perceived Desirability

<b>Items for Perceived Desirability</b>	<b>Author</b>
To what extent do you desire to have a new business?	Shapero and Sokol (1982) in Zhang et al. (2014b)
How tense would you be?	Krueger (1993)
How enthusiastic would you be?	
I would love doing it (I would love doing it—I would hate doing it)	
Being an entrepreneur implies more advantages than disadvantages to me	Liñán and Chen (2006)
A career as entrepreneur is attractive for me	
If I had the opportunity and resources, I'd like to start a firm	
Being an entrepreneur would entail great satisfactions for me	

*Continued on next page*

Table B.4 – *continued from previous page*

<b>Items</b>	<b>Author</b>
Among various options, I'd rather be an entrepreneur I would love doing starting my own business	
<i>(5=strongly agree, 1=strongly disagree)</i>	
I consider starting my own business very desirable. I consider starting my own business is an attractive idea. I consider an entrepreneurial career to be very desirable.	Shook and Bratianu (2010)
<i>Specific desirability (5=strongly agree, 1=strongly disagree)</i>	
Starting my own business would make me very tense (reverse scored). I would enjoy the autonomy that accompanies starting my own business. I would enjoy the personal satisfaction of starting my own business. I would enjoy the financial rewards of starting my own business. Starting my own business would give me a good quality of life.	

Table B.4: Items on Perceived Desirability identified in the literature

## B.5 Items on Perceived Feasibility

<b>Items</b>	<b>Author</b>
How hard would it be to run a new business?	Shapero and Sokol (1982) in Zhang et al. (2014b)
How certain are you of success? How sure of yourself are you?	
Start a firm and keep it working would be easy for me	Liñán and Chen (2006)
I'm prepared to start a viable firm I can control the creation process of a new firm I know the necessary practical details to start a firm	

*Continued on next page*

Table B.5 – *continued from previous page*

Items	Author
I know how to develop an entrepreneurial project	
If I tried to start a firm, I would have a high probability of succeeding	
How hard do you think it would be starting your own business?	
Do you know enough to start your own business	
How hard do you think it would be (very hard—very easy)	Krueger (1993)
How certain of success are you (very certain of success—very certain of failing)	
How overworked would you be (very overworked—not overworked at all)	
Do you know enough to start a business (know everything—know nothing)	
How sure of yourself (very sure of myself—very unsure of myself)	
It would be practical for me to start my own or co-owned tourism business	Shook and Bratianu (2010)
It would be feasible for me to start my own or co-owned tourism business	

Table B.5: Items on Perceived Feasibility identified in the literature.

## B.6 Items on Professional Attraction

Items	Author
Being an entrepreneur implies more advantages than disadvantages to me	Liñán and Chen (2006)
A career as entrepreneur is attractive for me	
If I had the opportunity and resources, I'd like to start a firm	
Being an entrepreneur would entail great satisfactions for me	
Among various options, I'd rather be an entrepreneur	

Table B.6: Items on Professional Attraction identified in the literature. Source: Liñán and Chen (2006)

# Appendix C

## Iterative Scales and Items Development

Item	Relevance			Interpretation	Clarity			Interpretation
	I-CVI_R	Pc	Mod. Kappa		I-CVI_C	Pc	Mod. Kappa	
BI03	1.00	0.0313	1.00	Relevant	0.80	0.0313	0.79	Needs revision
BI17	1.00	0.0313	1.00	Relevant	1.00	0.0313	1.00	Clear
BI15	1.00	0.0313	1.00	Relevant	1.00	0.0313	1.00	Clear
BI16	1.00	0.0313	1.00	Relevant	1.00	0.0313	1.00	Clear

Table C.1: Clarity about the Business Idea (first iteration, expert rating)

Item	Relevance			Interpretation	Clarity			Interpretation
	I-CVI_R	Pc	Mod. Kappa		I-CVI_C	Pc	Mod. Kappa	
C001	1.00	0.0313	1.00	Relevant	1.00	0.0313	1.00	Clear
C002	0.80	0.0313	0.79	Needs revision	0.80	0.0313	0.79	Needs revision
C003	0.80	0.0313	0.79	Needs revision	0.80	0.0313	0.79	Needs revision
C004	0.80	0.0313	0.79	Needs revision	0.80	0.0313	0.79	Needs revision
C005	1.00	0.0313	1.00	Relevant	0.80	0.0313	0.79	Needs revision
C006	1.00	0.0313	1.00	Relevant	0.60	0.1875	0.51	Needs revision
C007	1.00	0.0313	1.00	Relevant	0.80	0.0313	0.79	Needs revision
C008	1.00	0.0313	1.00	Relevant	0.80	0.0313	0.79	Needs revision
C009	1.00	0.0313	1.00	Relevant	0.80	0.0313	0.79	Needs revision
C010	1.00	0.0313	1.00	Relevant	1.00	0.0313	1.00	Clear

Table C.2: Clarity about core competences (first iteration, expert rating)

Item	Relevance			Interpretation	Clarity			Interpretation
	I-CVI_R	Pc	Mod. Kappa		I-CVI_C	Pc	Mod. Kappa	
PV01	1.00	0.0313	1.00	Relevant	0.60	0.1875	0.51	Needs revision
PV02	0.80	0.0313	0.79	Needs revision	0.80	0.0313	0.79	Needs revision
PV03	1.00	0.0313	1.00	Relevant	1.00	0.0313	1.00	Clear
PV04	1.00	0.0313	1.00	Relevant	1.00	0.0313	1.00	Clear
PV05	0.8	0.0313	0.79	Needs revision	1.00	0.0313	1.00	Needs revision

Table C.3: Clarity about Personal Values (first iteration, expert rating)

Item	Relevance (Expert rating)				Clarity (Student rating)			
	I-CVI_R	Pc	Kappa	Interpretation	I-CVI_C	Pc	Kappa	Interpretation
I know my potential customers	1	0.03125	1	Relevant	1	0.03125	1	Clear
I have a clear understanding of my Business Idea	1	0,03125	1	Relevant	1	0.03125	1	Clear
I know the problems I want to solve	1	0.03125	1	Relevant	1	0.03125	1	Clear
I can easily describe the Business Idea to a friend or partner	1	0,03125	1	Relevant	1	0.03125	1	Clear
I know which product or service I want to develop	1	0,03125	1	Relevant	1	0.03125	1	Clear

Table C.4: Clarity about the Business Idea (second iteration)

Item	Relevance (Expert rating)				Clarity (Student rating)			
	I-CVI_R	Pc	Kappa	Interpretation	I-CVI_C	Pc	Kappa	Interpretation
I know my most important personal values	1	0.03125	1	Relevant	1	0.03125	1	Clear
I know what is important to me in my life	1	0,03125	1	Relevant	1	0.03125	1	Clear
I know what motivates me in my life	1	0.03125	1	Relevant	1	0.03125	1	Clear

Table C.5: Clarity about the Personal Values (second iteration)

Item	Relevance (Expert rating)				Clarity (Student rating)			
	I-CVI_R	Pc	Kappa	Interpretation	I-CVI_C	Pc	Kappa	Interpretation
I know the things I am good at doing	1	0.03125	1	Relevant	1	0.03125	1	Clear
I know my most developed skills	1	0,03125	1	Relevant	1	0.03125	1	Clear
I have knowledge that helps me solving problems in my professional life	1	0.03125	1	Relevant	1	0.03125	1	Clear
I know my attitude towards entrepreneurship	1	0,03125	1	Relevant	1	0.03125	1	Clear

Table C.6: Clarity about the Core Competences (second iteration)

Item	Relevance (Expert rating)				Clarity (Student rating)			
	I-CVI_R	Pc	Kappa	Interpretation	I-CVI_C	Pc	Kappa	Interpretation
Estimate the anticipated long-term profitability	1	0.03125	1	Relevant	1	0.03125	1	Clear
Estimate the anticipated potential to increase the profitability over time through efficiency gains	1	0.03125	1	Relevant	1	0.03125	1	Clear
Estimate the anticipated potential to increase the profitability through additional revenue streams	1	0.03125	1	Relevant	1	0.03125	1	Clear

Table C.7: Anticipated Profitability (second iteration)

Item	Relevance (Expert rating)				Clarity (Student rating)			
	I-CVI_R	Pc	Kappa	Interpretation	I-CVI_C	Pc	Kappa	Interpretation
How do you estimate the potential market size for your offering?	-	-	-	-	-	-	-	-
How do you estimate the market growth in the near future?	-	-	-	-	-	-	-	-
How do you estimate the intensity of competition?	-	-	-	-	-	-	-	-
How do you estimate the entry barriers to the market?	-	-	-	-	-	-	-	-
How do you estimate the thread of substitutes for your offering?	-	-	-	-	-	-	-	-

Table C.8: Perceived Market Attractiveness

Item	Relevance (Expert rating)				Clarity (Student rating)			
	I-CVI_R	Pc	Kappa	Interpretation	I-CVI_C	Pc	Kappa	Interpretation
I believe that my Personal Values are well reflected in the Business Idea	1	0.03125	1	Relevant	1	0.03125	1	Clear
The Business Idea reflects what is important to me	1	0.03125	1	Relevant	1	0.03125	1	Clear
The Business Idea motivates me doing what is important to me	1	0.03125	1	Relevant	1	0.03125	1	Clear

Table C.9: Perceived Values-Business Idea Fit (second iteration)

Item	Relevance (Expert rating)				Clarity (Student rating)			
	I-CVI_R	Pc	Kappa	Interpretation	I-CVI_C	Pc	Kappa	Interpretation
I have the right knowledge to realize my business idea	1	0.03125	1	Relevant	1	0.03125	1	Clear
I have the right skills to realize my business idea	1	0.03125	1	Relevant	1	0.03125	1	Clear
I have the right attitudes to realize my business idea	1	0.03125	1	Relevant	1	0.03125	1	Clear
I believe that my core competences are well reflected in the Business Idea	1	0.03125	1	Relevant	1	0.03125	1	Clear

Table C.10: Perceived core Competences-Business Idea Fit (second iteration)

Item	Relevance (Expert rating)				Clarity (Student rating)			
	I-CVI_R	Pc	Kappa	Interpretation	I-CVI_C	Pc	Kappa	Interpretation
Please rate the potential impact of the product/ service on the environment	1	0.03125	1	Relevant	1	0.03125	1	Clear
Please rate the potential impact of the product/ service on people 's well-being	1	0.03125	1	Relevant	1	0.03125	1	Clear
Please rate the potential income generated by the product/service	1	0.03125	1	Relevant	1	0.03125	1	Clear

Table C.11: Perceived Value Contribution (second iteration)

Item	Relevance (Expert rating)				Clarity (Student rating)			
	I-CVI_R	Pc	Kappa	Interpretation	I-CVI_C	Pc	Kappa	Interpretation
I have the right resources to successfully realize my business idea	1	0.03125	1	Relevant	1	0.03125	1	Clear
I have easy access to key resources to successfully realize my business idea	1	0.03125	1	Relevant	1	0.03125	1	Clear

Table C.12: Access to Key Resources (second iteration)

Item	Relevance (Expert rating)				Clarity (Student rating)			
	I-CVI_R	Pc	Kappa	Interpretation	I-CVI_C	Pc	Kappa	Interpretation
I would love starting my own business based on my business idea	1	0.03125	1	Relevant	1	0.03125	1	Clear
I would be very enthusiastic working on my business idea	1	0.03125	1	Relevant	1	0.03125	1	Clear
To what extend do you like your Business Idea?	1	0.03125	1	Relevant	1	0.03125	1	Clear

Table C.13: Perceived Desirability of the Business Idea (second iteration)

Item	Relevance (Expert rating)				Clarity (Student rating)			
	I-CVI_R	Pc	Kappa	Interpretation	I-CVI_C	Pc	Kappa	Interpretation
I am confident that I would succeed if I realize my business idea	1	0.03125	1	Relevant	1	0.03125	1	Clear
It would be easy for me to realize my business idea	1	0.03125	1	Relevant	1	0.03125	1	Clear
I will be able to successfully solve potential problems related to my business idea	1	0.03125	1	Relevant	1	0.03125	1	Clear

Table C.14: Perceived Feasibility of the Business Idea (second iteration)



# Appendix D

## Explorative Data Analysis

### D.1 Missing Data Analysis

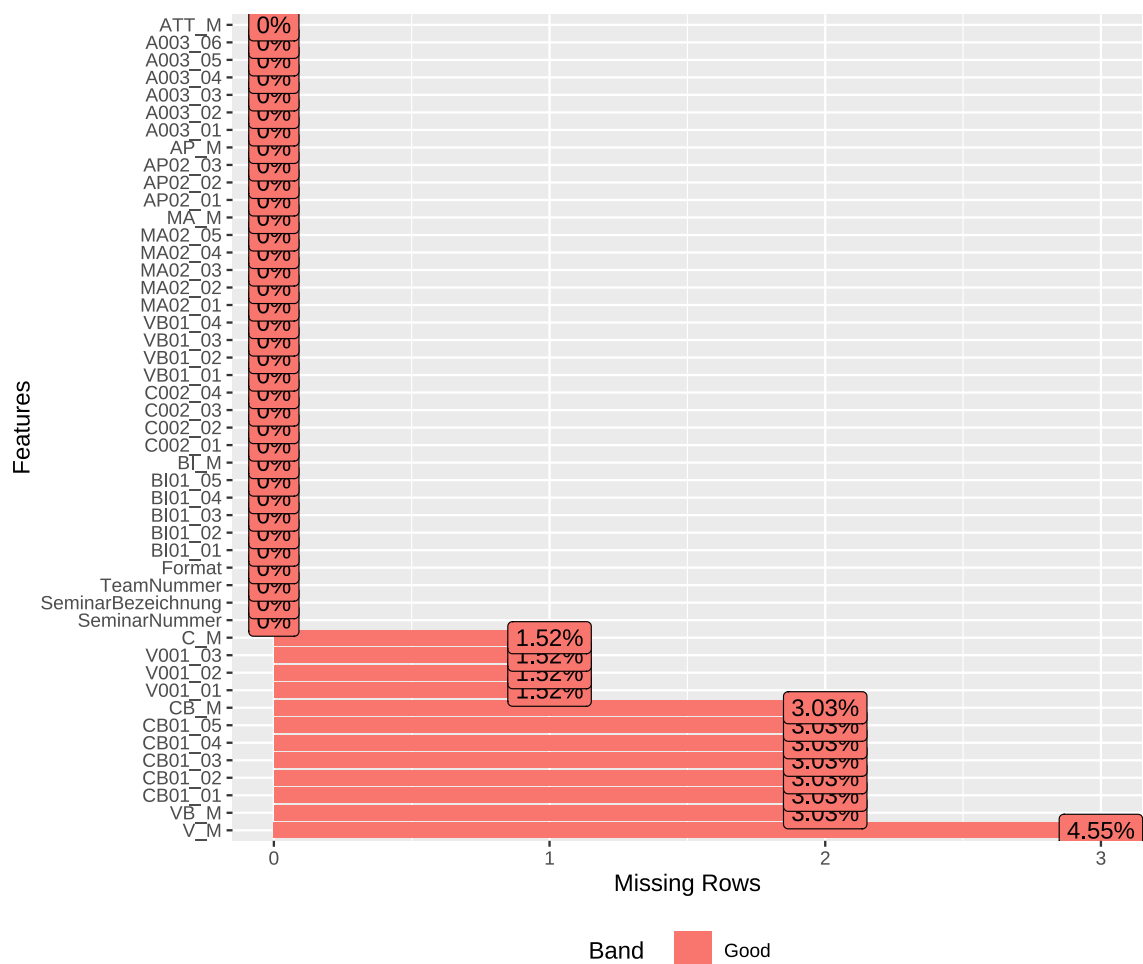


Figure D.1: Missing data analysis

## D.2 Density Plots

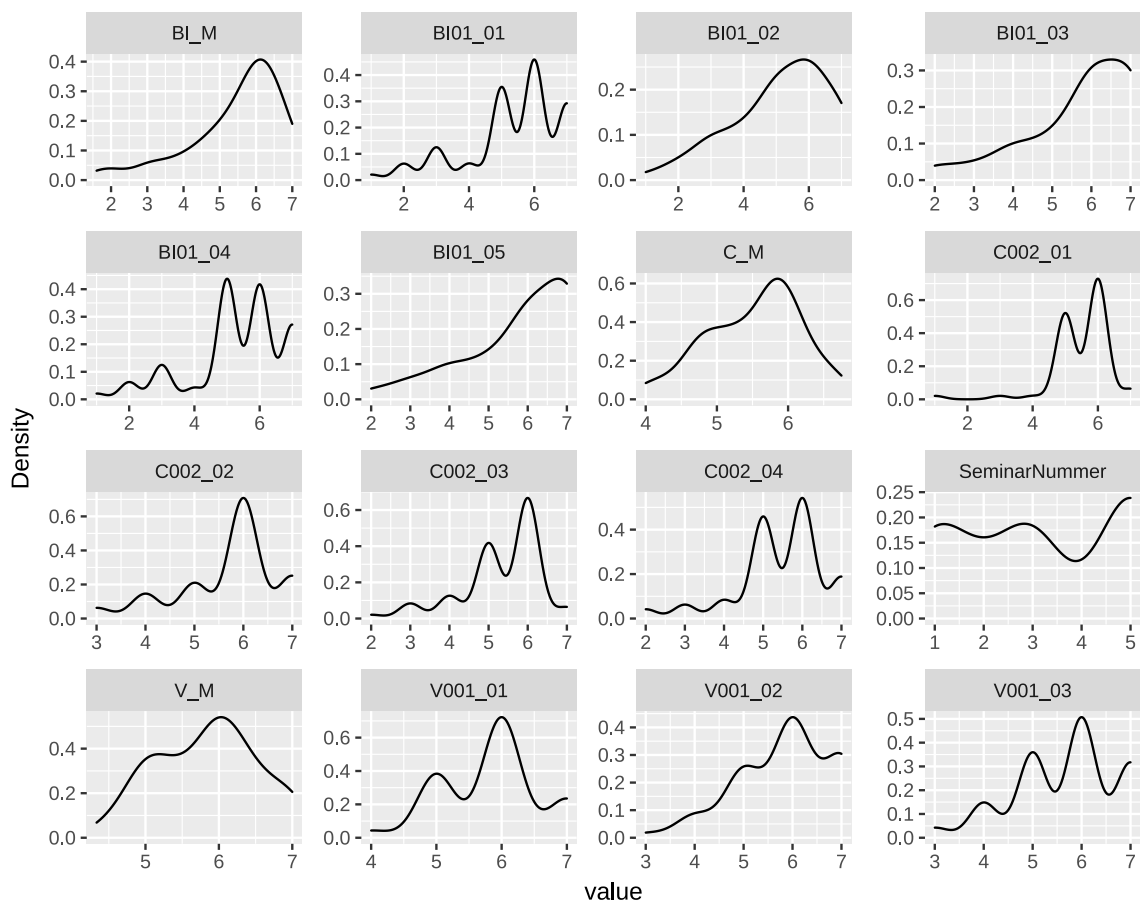


Figure D.2: Density Plot 1

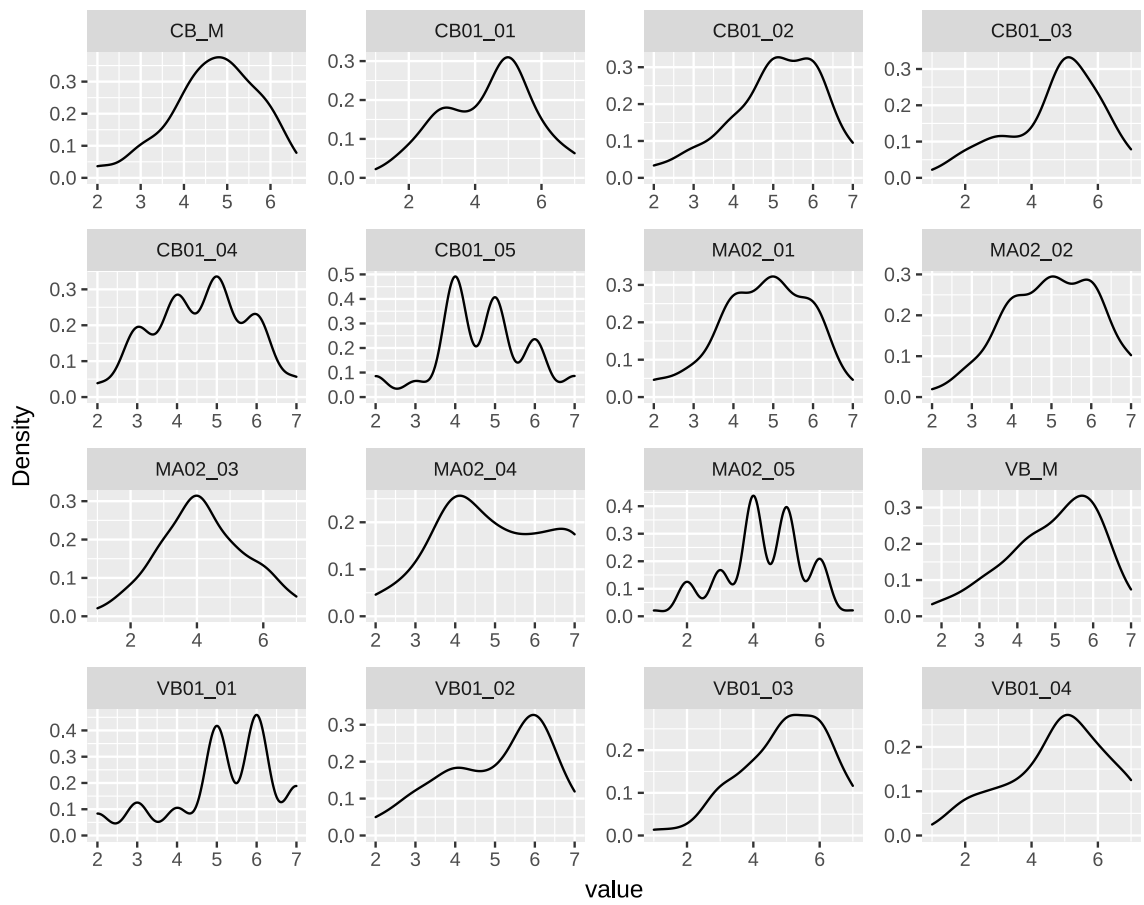


Figure D.3: Density Plot 2

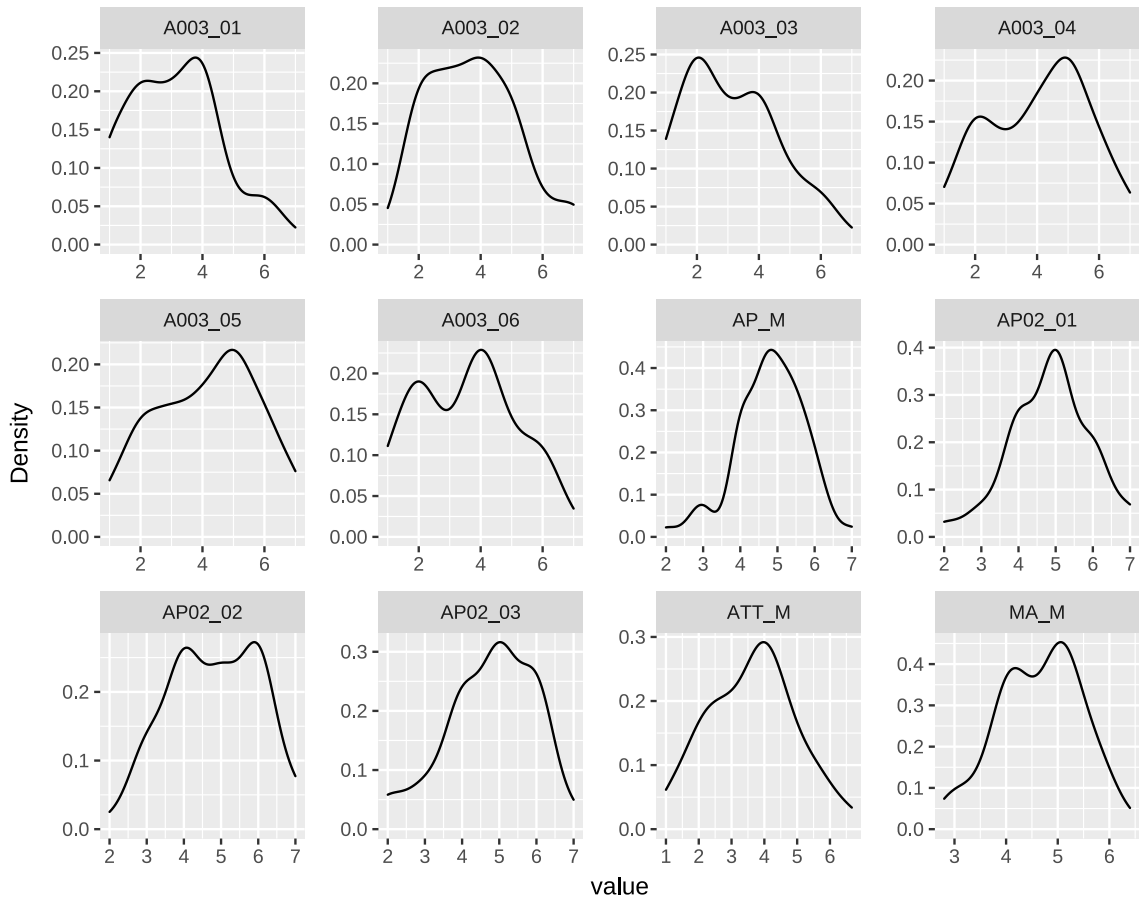


Figure D.4: Density Plot 3

### D.3 Boxplots

#### Anticipated Profitability

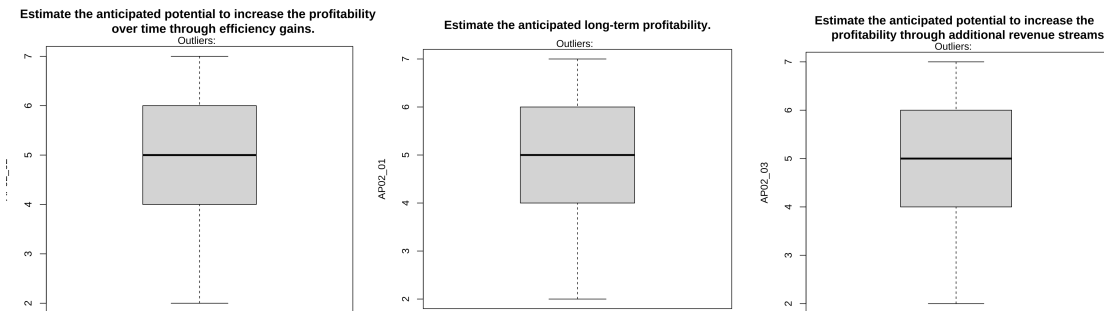


Figure D.5: Anticipated Profitability

### Perceived Market Attractiveness

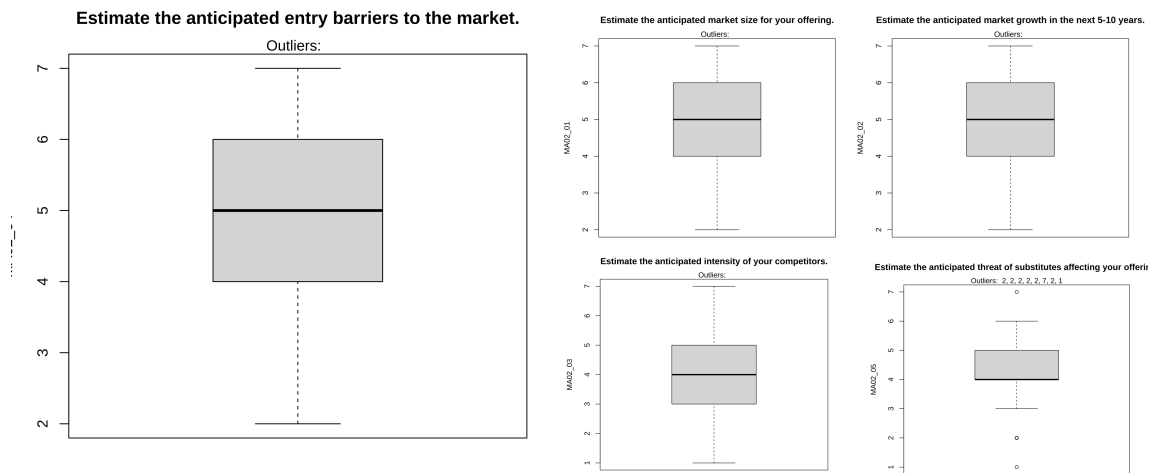


Figure D.6: Market Attractiveness

### Clarity about the core competences

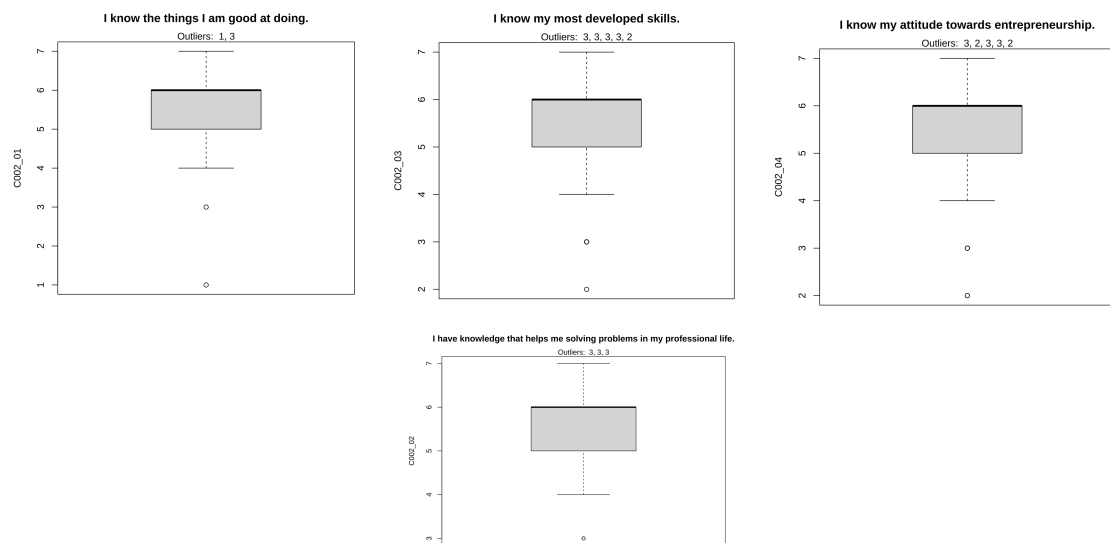


Figure D.7: Clarity about core competences

### Clarity about the personal values

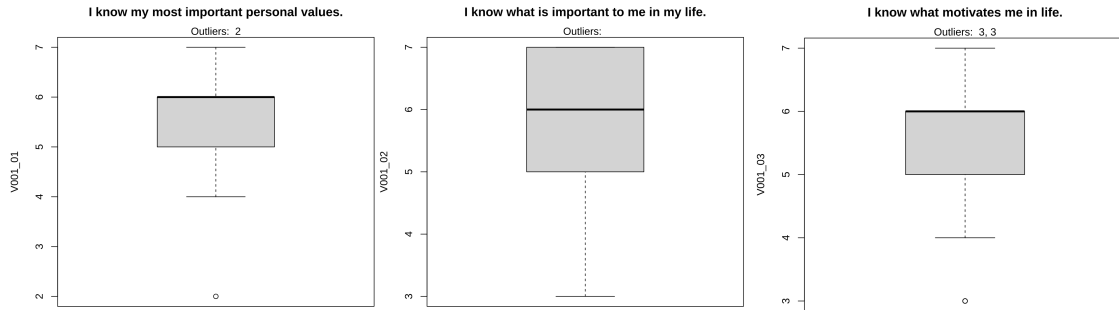


Figure D.8: Clarity about personal values

### Clarity about the business idea

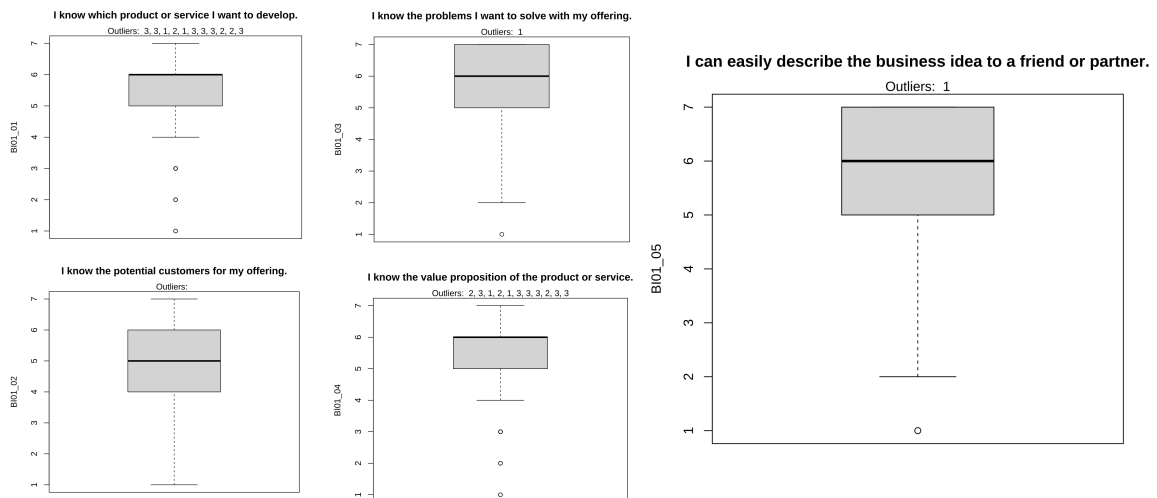


Figure D.9: Clarity about the business idea

### Competence- Business Idea Fit

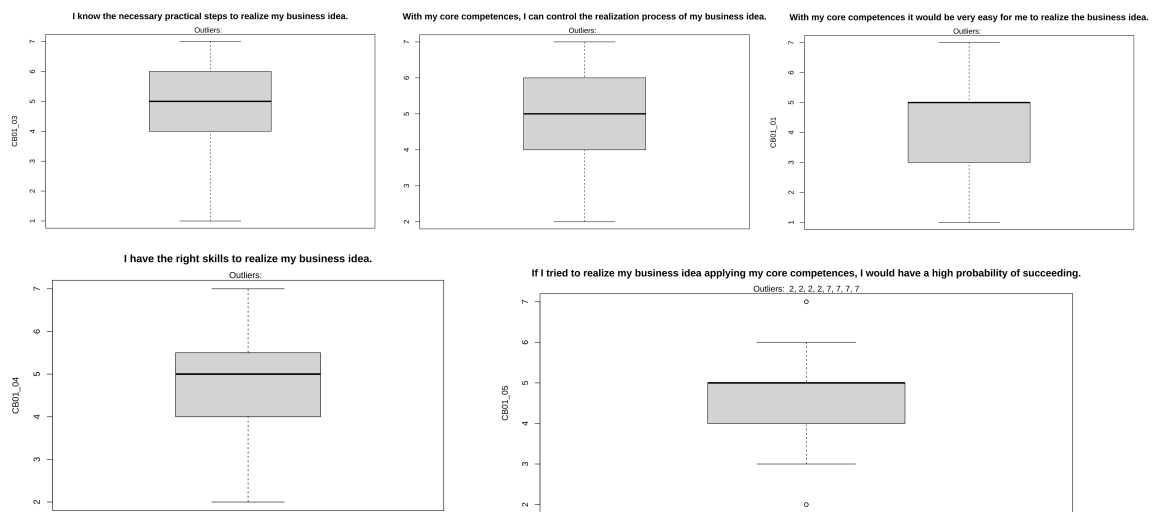


Figure D.10: Competence-business idea fit

### Values- Business Idea Fit

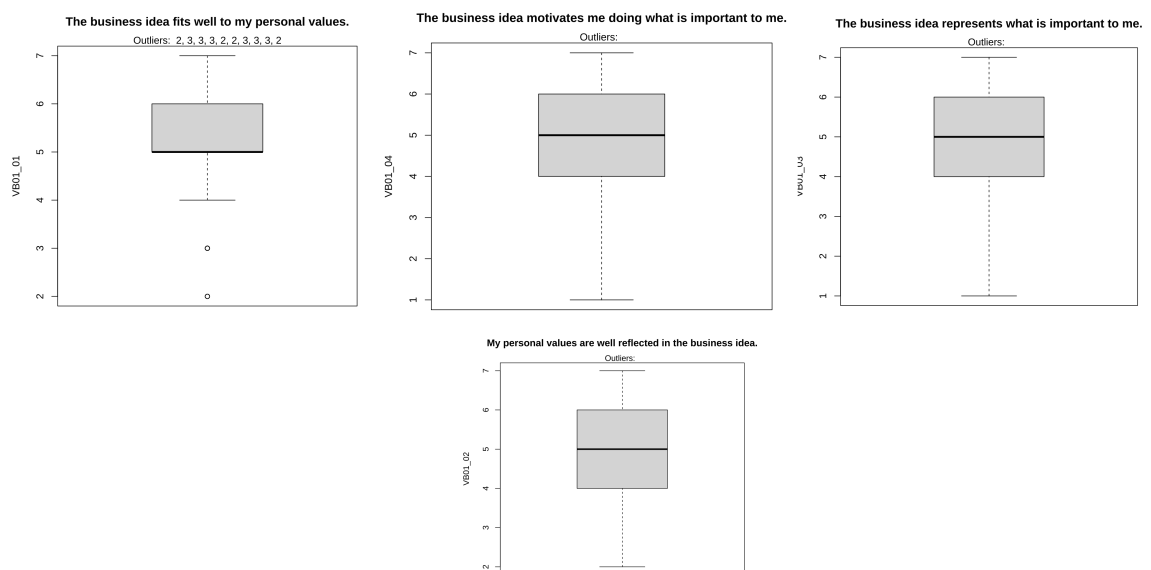


Figure D.11: Values-business idea fit

### Perceived desirability of the business idea

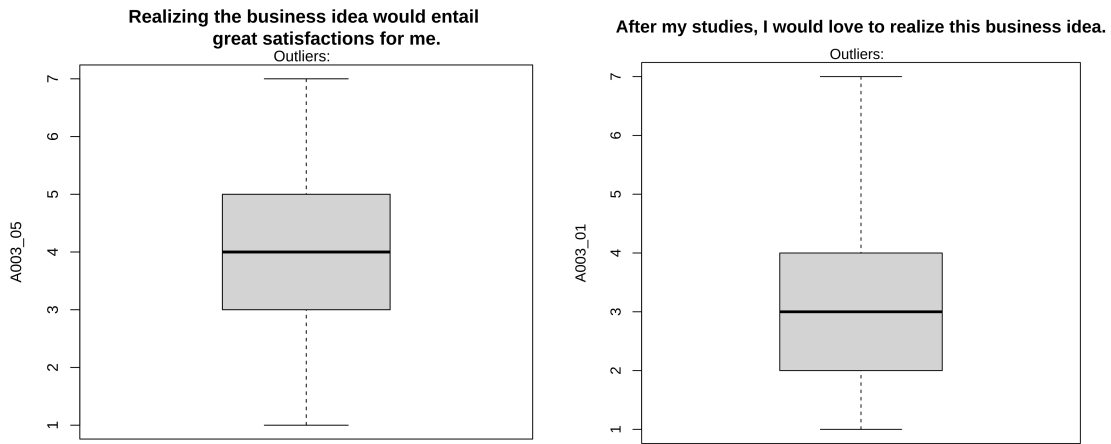


Figure D.12: Perceived desirability of the business idea

## D.4 Linearity Check for Pearson Correlation

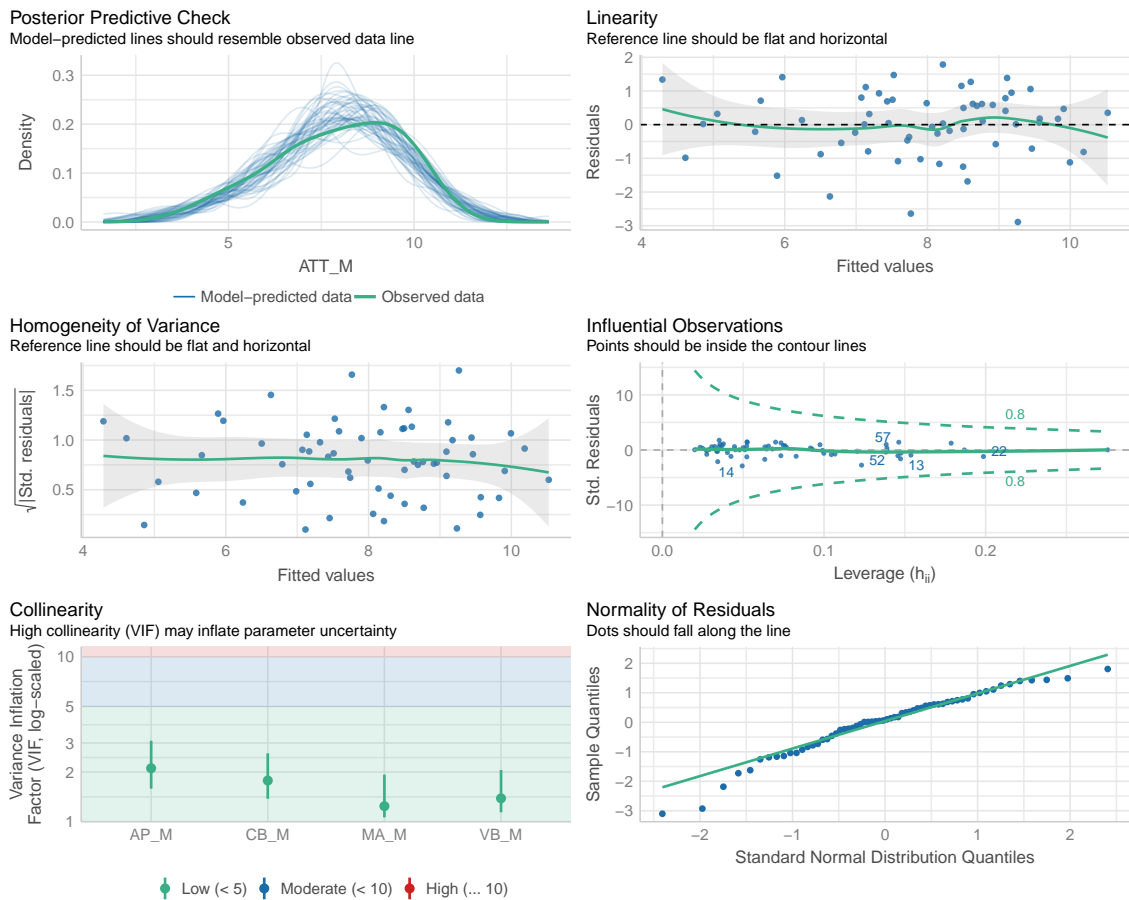


Figure D.13: Linearity Check with mean values on the construct level



**D.5 Correlation Matrix**

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 VB01_01	1.00												
2 VB01_02	0.83	1.00											
3 VB01_03	0.72	0.78	1.00										
4 VB01_04	0.65	0.72	0.81	1.00									
5 CB01_02	0.34	0.36	0.36	0.37	1.00								
6 CB01_03	0.32	0.30	0.29	0.31	0.62	1.00							
7 CB01_04	0.49	0.43	0.52	0.50	0.69	0.54	1.00						
8 CB01_05	0.40	0.38	0.41	0.45	0.65	0.52	0.62	1.00					
9 AP02_01	0.36	0.41	0.48	0.36	0.37	0.28	0.52	0.39	1.00				
10 AP02_02	0.20	0.24	0.33	0.38	0.46	0.43	0.54	0.47	0.51	1.00			
11 AP02_03	0.27	0.20	0.30	0.37	0.35	0.23	0.41	0.46	0.39	0.42	1.00		
12 MA02_02	0.35	0.43	0.42	0.36	0.30	0.33	0.44	0.33	0.42	0.30	0.16	1.00	
13 MA02_01	0.40	0.45	0.38	0.34	0.16	0.23	0.18	0.15	0.44	0.24	0.17	0.52	1.00

Table D.1: Correlation Matrix



# **Appendix E**

## **Exploratory Factor Analysis**

### **E.1 Output of the EFA Analysis**

## APPENDIX E. EXPLORATORY FACTOR ANALYSIS

```
print(fit1, digits = 2, cutoff=.3, sort= TRUE)
```

```
Call:
factanal(x = IKIGAI_EFA, factors = 5, rotation = "promax")

Uniquenesses:
VB01_01 VB01_02 VB01_03 VB01_04 CB01_01 CB01_02 CB01_03 CB01_04
  0.22   0.13   0.27   0.33   0.31   0.23   0.53   0.27
CB01_05 MA02_01 MA02_02 MA02_03 MA02_04 MA02_05 AP02_01 AP02_02
  0.37   0.54   0.61   0.75   0.68   0.86   0.44   0.49
AP02_03 A003_01 A003_02 A003_03 A003_04 A003_05 A003_06
  0.71   0.10   0.23   0.51   0.22   0.00   0.40

Loadings:
      Factor1 Factor2 Factor3 Factor4 Factor5
CB01_01  0.97
CB01_02  0.99
CB01_03  0.65
CB01_04  0.70
CB01_05  0.65
A003_02      0.67              0.46
A003_03      0.61
A003_04      0.71
A003_05      0.93
A003_06      0.57
VB01_01              0.93
VB01_02              0.92
VB01_03              0.77
VB01_04              0.60
MA02_03              0.50
MA02_04              0.57
A003_01      0.66              0.67
MA02_01              0.34  0.45  0.30
MA02_02              0.42
MA02_05              0.35
AP02_01              0.46  0.37
AP02_02  0.41              0.37
AP02_03

      Factor1 Factor2 Factor3 Factor4 Factor5
SS loadings      3.72  3.14  3.00  1.63  1.36
Proportion Var   0.16  0.14  0.13  0.07  0.06
Cumulative Var   0.16  0.30  0.43  0.50  0.56

Factor Correlations:
      Factor1 Factor2 Factor3 Factor4 Factor5
Factor1  1.000  0.53  0.51  0.41 -0.074
Factor2  0.527  1.00  0.47  0.53 -0.277
Factor3  0.506  0.47  1.00  0.58 -0.298
Factor4  0.408  0.53  0.58  1.00 -0.183
Factor5 -0.074 -0.28 -0.30 -0.18  1.000

Test of the hypothesis that 5 factors are sufficient.
The chi square statistic is 142.48 on 148 degrees of freedom.
The p-value is 0.613
```

Figure E.1: Output of the EFA analysis (original 5 factor model)

```
print(fit4, digits = 2, cutoff=.3, sort= TRUE)
```

```
Call:
factanal(x = IKIGAI_EFA_OPT, factors = 3, rotation = "promax")

Uniquenesses:
VB01_01 VB01_02 VB01_03 VB01_04 CB01_01 CB01_02
  0.22    0.15    0.26    0.32    0.31    0.20
CB01_03 CB01_04 CB01_05 A003_01 A003_02 A003_03
  0.56    0.31    0.42    0.28    0.25    0.56
A003_04 A003_05 A003_06
  0.26    0.21    0.49

Loadings:
      Factor1 Factor2 Factor3
A003_01  0.94
A003_02  0.90
A003_03  0.69
A003_04  0.78
A003_05  0.82
A003_06  0.75
CB01_01           0.92
CB01_02           0.96
CB01_03           0.66
CB01_04           0.70
CB01_05           0.58
VB01_01           0.94
VB01_02           0.94
VB01_03           0.82
VB01_04           0.64

      Factor1 Factor2 Factor3
SS loadings      4.17   3.05   2.92
Proportion Var   0.28   0.20   0.19
Cumulative Var   0.28   0.48   0.68

Factor Correlations:
      Factor1 Factor2 Factor3
Factor1  1.00  -0.51  -0.64
Factor2 -0.51   1.00   0.57
Factor3 -0.64   0.57   1.00

Test of the hypothesis that 3 factors are sufficient.
The chi square statistic is 87.17 on 63 degrees of freedom.
The p-value is 0.0236
```

Figure E.2: Output of the EFA analysis (optimized 3 factor model)

```
fit5
```

```
Principal Components Analysis
```

```
Call: principal(r = IKIGAI_EFA_IT3, nfactors = 5, rotate = "promax")
```

```
Standardized loadings (pattern matrix) based upon correlation matrix
```

	RC1	RC2	RC5	RC3	RC4
SS loadings	3.38	2.64	1.83	1.50	1.07
Proportion Var	0.26	0.20	0.14	0.12	0.08
Cumulative Var	0.26	0.46	0.60	0.72	0.80
Proportion Explained	0.32	0.25	0.18	0.14	0.10
Cumulative Proportion	0.32	0.58	0.75	0.90	1.00

```
With component correlations of
```

	RC1	RC2	RC5	RC3	RC4
RC1	1.00	0.49	0.49	0.41	0.29
RC2	0.49	1.00	0.57	0.23	0.34
RC5	0.49	0.57	1.00	0.34	0.39
RC3	0.41	0.23	0.34	1.00	-0.01
RC4	0.29	0.34	0.39	-0.01	1.00

```
Mean item complexity = 1.3
```

```
Test of the hypothesis that 5 components are sufficient.
```

```
The root mean square of the residuals (RMSR) is 0.05  
with the empirical chi square 27.66 with prob < 0.23
```

```
Fit based upon off diagonal values = 0.99
```

Figure E.3: Results of the principal component analysis

```
summary(fit, fit.measures = TRUE)

lavaan 0.6.14 ended normally after 95 iterations

Estimator ML
Optimization method NLMINB
Number of model parameters 79

Number of observations 66
Number of missing patterns 2

Model Test User Model:

Test statistic 294.485
Degrees of freedom 220
P-value (Chi-square) 0.001

Model Test Baseline Model:

Test statistic 1105.242
Degrees of freedom 253
P-value 0.000

User Model versus Baseline Model:

Comparative Fit Index (CFI) 0.913
Tucker-Lewis Index (TLI) 0.899

Robust Comparative Fit Index (CFI) 0.912
Robust Tucker-Lewis Index (TLI) 0.899

Loglikelihood and Information Criteria:

Loglikelihood user model (H0) -2179.677
Loglikelihood unrestricted model (H1) -2032.434

Akaike (AIC) 4517.354
Bayesian (BIC) 4690.337
Sample-size adjusted Bayesian (SABIC) 4441.629

Root Mean Square Error of Approximation:

RMSEA 0.072
90 Percent confidence interval - lower 0.048
90 Percent confidence interval - upper 0.092
P-value H_0: RMSEA <= 0.050 0.062
P-value H_0: RMSEA >= 0.080 0.264

Robust RMSEA 0.072
90 Percent confidence interval - lower 0.049
90 Percent confidence interval - upper 0.093
P-value H_0: Robust RMSEA <= 0.050 0.060
P-value H_0: Robust RMSEA >= 0.080 0.275

Standardized Root Mean Square Residual:

SRMR 0.088
```

Figure E.4: Results of the Confirmatory Factor Analysis using the lavaan package in R





# Appendix F

## Correlation Analysis

The correlation of the constructs was calculated using the "cor.test()" function in R. A Pearson product-moment correlation coefficient was computed to assess the relationship between the perceived desirability of the business idea (ATT\_M) and the four key components personal values-business idea fit (VB\_M), core competence-business idea fit (CB\_M), Perceived Market Attractiveness (MA\_M), and Anticipated Profitability (AP\_M). The correlation coefficients and the significance levels are presented in table F.1).

In the psychology domain, Dancey and Reidy (2007) presents the following guidelines for assessing the size of the correlation coefficients: 0.1-0.3 as weak, 0,4-0,6 as moderate, 0,7-0,9 as strong and 1 as perfect. These thresh holds can be used for orientation for precise measures, such as net rent or actual economic growth. For "softly measured" characteristics, such as attitudes, correlations around 0.5 are more likely to be the maximum and should therefore be taken more seriously (Fahrmeir et al., 2016). Similarly, Cohen (2013) reports values 0,1-0,3 as weak, 0,3-0,5 as moderate and above 0,5 as strong. The following procedure of statistical hypothesis testing needs to be performed according to Backhaus et al. (2021): I) Formulation of hypotheses, II) computation of the statistic, III) choosing an error probability  $\alpha$  (significance level), IV) deriving a critical test value, and V) comparing the test statistic with the critical test value.

### Formulating of Hypotheses

The hypotheses have been formulated as directional hypotheses in table 6.13. For each of the hypotheses (H1-H4), the following is stated:

- $H_0$  : No relation between the variables exists
- $H_A$  : The variables are correlated

The correlation between the variables has been computed using the Pearson r correlation. The results are presented in the correlation matrix in table F.1. The coefficients (r) indicate positive ( $> 0$ ) correlations with weak to strong correlations. The significance level of  $\alpha = 5\%$  is a standard error probability and was used for the analysis. Comparing the p-values with  $\alpha = 5\%$  threshold, a solid and significant correlation between the desirability of the business idea (ATT\_M) and the perceived market attractiveness (MA\_M) can not be observed ( $p = 0.0538 > \alpha$ ). The hypotheses test results are presented in table F.2. The  $H_0$  for the relation between the market attractiveness and the desirability of the business idea can not be rejected.

If the p-value is less than the significance level ( $\alpha = 0.05$ ), the decision is to reject the null hypothesis. In conclusion, there is sufficient evidence that there is a significant linear relationship between X and Y because the correlation coefficient is significantly different from zero. On the other hand, if the p-value is not less than the significance level ( $\alpha = 0.05$ ), the Null hypothesis can not be rejected. Thus, there is insufficient evidence to conclude that there is a significant linear relationship between X and Y because the correlation coefficient is NOT significantly different from zero.

## Results and Discussion

The study aims to determine if there is a strong positive and significant relationship between the desirability of the business idea (ATT\_M) and market attractiveness (MA\_M), core competence- business idea fit (CB\_M), anticipated profitability (AP\_M), and the personal values- business idea fit (VB\_M). The collected data were analyzed using the Pearson r correlation. The results in fig. F.1 show that there is a strong positive and significant correlation between three of the four constructs of interest: the desirability of the business idea correlates with the personal values-business idea fit ( $r = .62, p = 7.64e-08$ ), the anticipated profitability ( $r = .50, p = 3.03e-05$ ), and the core competences-business idea fit ( $r = .58, p = 1.23e-06$ ). A strong and significant correlation between the desirability of the business idea and the market attractiveness could not be identified ( $r = .24, p = 3.03e-05$ ). At the same time, some constructs indicate a remarkable correlation where, theoretically, no correlation should be observed (e.g., anticipated profitability and personal values- business idea fit). The correlation between two constructs is measured in the literature by discriminant validity. Rönkkö and Cho (2022, p.11) define discriminant validity as

*"Two measures intended to measure distinct constructs have discriminant validity if the absolute value of the correlation between the measures after correcting for measurement error is low enough for the measures to be regarded as measuring distinct constructs."*

Problems with that measure can occur if items measure more than one construct (i.e., cross-loadings) or the constructs are not empirically distinct (i.e., high correlation). Rönkkö and Cho (2022) propose a three-step process to identify the sources for the high correlations between the constructs:

1. Suspect conceptual redundancy: Reviewing the items and the definition of both constructs, it can be stated that the anticipated profitability and core competences-business idea fit are conceptually distinct.
2. Scrutinize the measurement model: Wrong assumptions and theoretical misconstruction can lead to a miss-modified model. This consideration applies to the model specification when using structural equation models, which is not the case in the current study (see discriminant analysis in section 6.9.4.)
3. Collect different data: Systematic error in the sampling design can occur, or small samples can lead to a multicollinearity problem.

The third case may apply to the underlying study. First, the study is based on small sample size (66). Second, the sample might be empirically not distinguishable since the target group was students with a potentially similar context, background knowledge and entrepreneurial experience, which can lead to a systematic error in the sampling design. Another potential reason can be an "emotional bias", which shows in the case of a high personal value- business idea fit a positive evaluation of the anticipated profitability.

The underlying hypotheses of the study are directional. For that reason, in addition to the two-tailed correlation analysis in table F.1, a one-tailed analysis was performed with the focal constructs. According to Pillemer (1991), the alternative hypothesis of a one-tailed test is directional, whereas, with a two-tailed test, it is non-directional. The results and hypotheses summary are shown in table F.2.

	<b>VB_M</b>	<b>CB_M</b>	<b>MA_M</b>	<b>AP_M</b>	<b>ATT_M</b>
<b>VB_M</b>					
<b>CB_M</b>	0.45***				
<b>MA_M</b>	0.27*	0.21			
<b>AP_M</b>	0.5***	0.64***	0.42***		
<b>ATT_M</b>	0.62***	0.58***	0.24	0.50***	

Table F.1: Correlation Matrix with Pearson r correlation (One-tailed)

<b>Nr.</b>	<b>Hypothesis</b>	<b>Expected relation</b>	<b>Result</b>
H1:	The higher the perceived market attractiveness, the higher the perceived desirability of the business idea.	Significant   Positive	(?) <b>Not confirmed</b> (r= .24) ✘
H2:	The higher the anticipated profitability, the higher the perceived desirability of the business idea.	Significant   Positive	<b>Confirmed</b> (r= .50***) ✔
H3:	The higher the perceived fit between the core competences and the business idea, the higher the perceived desirability of the business idea.	Significant   Positive	<b>Confirmed</b> (r= .58***) ✔
H4:	The higher the perceived fit between the personal values and the business idea, the higher the perceived desirability of the business idea.	Significant   Positive	<b>Confirmed</b> (r= .62***) ✔

Table F.2: Validation of initial hypotheses with Pearson r correlation (One-tailed)

# Appendix G

## Qualitative Feedback (Pre-Study)

Course	What did you like?	What could be improved?
Entrepreneurship Basics Track 1. Summer 2020	Ich fand es gut, sich mit den persönlichen Kompetenzen auseinander zu setzen. Auch hat man durch das schrittweise Vorgehen in Mural einen guten Einblick bekommen wie man langsam eine Geschäftsidee entwickelt. War bisher sehr zufrieden	Ein zweiter/dritter Weg ohne UN SDGs an Ideen zu kommen.
Entrepreneurship Basics Track 1 Summer 2020	Interessante Einblicke in die eigenen Core Values. Anfangskonzepte zum Erkennen von Geschäftsideen. Fördert Kreativität deutlich!	Etwas genauer definieren, in welche Richtung sich das ganze bewegen soll. Vor dem Kurs schon Anreize geben, Geschäftsideen mit den SDG zu entdecken.

*Continued on next page*

Table G.1 – *continued from previous page*

<b>Course</b>	<b>What did you like?</b>	<b>What could be improved?</b>
Entrepreneurship Basics Track 1 Summer 2020	Thought process within the team.	Teilnehmern vor Beginn des Seminars die Möglichkeit geben, sich über SDGs zu informieren. Man ging völlig planlos und ineffizient in die Gruppen und jeder musste erstmals googlen, um über Themen halbwegs informiert zu sein. Während der Gruppensession hatte man keine Zeit sich gründlich mit Themen auseinanderzusetzen
Entrepreneurship Basics Track 1 Summer 2020	A lot of independent Team work.	More discussion in your group rather than in the whole community so you can focus on your idea(s) and don't get distracted by all the other idea(s). In the end you are more focused towards your goal
Entrepreneurship Basics Track 1 Summer 2020	We are divided into teams and guided by the lecturer that gave us clear instructions and are open to questions.	It seems too serious, maybe can add some more ice breaker or games that is related to the session to make it more fun.
Entrepreneurship Basics Track 1 Summer 2020	Struktureller Aufbau und das Arbeiten in den Kleingruppen	Konkreter die Ziele formulieren. Sollten wir am Ende wirklich schon eine Idee haben, oder nur ein Feld in dem wir uns bewegen?
Entrepreneurship Basics Track 1 Summer 2020	The atmosphere ist really gut, and we can really learn a lot from this seminar	Sometimes we are not quite sure about the requirements of some tasks.

*Continued on next page*

Table G.1 – *continued from previous page*

<b>Course</b>	<b>What did you like?</b>	<b>What could be improved?</b>
Entrepreneurship Basics Track 1 Summer 2020	Good structure, interesting Patents, ideation in combination with time boxing, freedom Go Develop ideas, Instant and helpful Feedback from lecturers, good atmosphere, Break Out Sessions extremely prdouctive	Mode structured approach in evaulating the quality of an opportunity (using more sophisticated and factors for deeper insights Like: time to development, Market Size estimation, competitors, partners, financial viability...)
Business Planning for Founders Summer 2020	Nice course structure, mostly high-quality materials, intensive collaboration with the lecturers and valuable feedback	
Entrepreneurship Basics Track 1 Summer 2020	The organization and preparation of the seminar	
Entrepreneurship Basics Track 1 Summer 2020	I liked that its first taught and after that we had to use our new gained knowledge so at the end you keep way more of what you've learned.	
Entrepreneurship Basics (Track 1) Winter 2020/21	Man kriegt was auf der Verpackung steht. Ich habe Methoden erlernt um Ideen zu finden, entwickeln und zu bewerten	
Entrepreneurship Basics (Track 1) Winter 2020/21	Die Value und Competence Templates im Einzelnen und als Gruppe, denn man bekommt einen schnellen Überblick, mit wem man zusammenarbeitet und was diese Person kann und was ihre Werte sind.	Mehr Teilnehmer, dadurch mehr Gruppen, dadurch mehr Auswahl bei den SDG's.

*Continued on next page*

Table G.1 – *continued from previous page*

<b>Course</b>	<b>What did you like?</b>	<b>What could be improved?</b>
Entrepreneurship Basics (Track 1) Winter 2020/21	Presentation about the personal and team values as well as the strategic process of developing a business idea.	Before going to the group phase do a round of discussion with currently relevant problems of our community to create some input, with which the team can go on choosing their UN SDG Goal and business ideas.
Entrepreneurship Basics (Track 1) Winter 2020/21	Die Kombination aus Input, Reflexion und Teamarbeit  Besonders gut hat mir die systematische und interaktive Herangehensweise eine Geschäftsidee zu finden gefallen.	
Entrepreneurship Basics (Track 1) Winter 2020/21	We received a lot of help but also criticism when we were on the wrong track.	It was a bit less time to think about certain ideas and problems. More time would have been a bit better.
Entrepreneurship Basics (Track 1) Winter 2020/21	Good structure and content. Nice interaction and tools	
Entrepreneurship Basics (Track 1) Winter 2020/21	a lot of team work, good prepared lectures with valuable content, changing speakers (not so boring as if only one speaker would hold the lectures of the week)	

Table G.1: Students' qualitative feedback on the Opportunity Recognition workshop



# Appendix H

## Templates

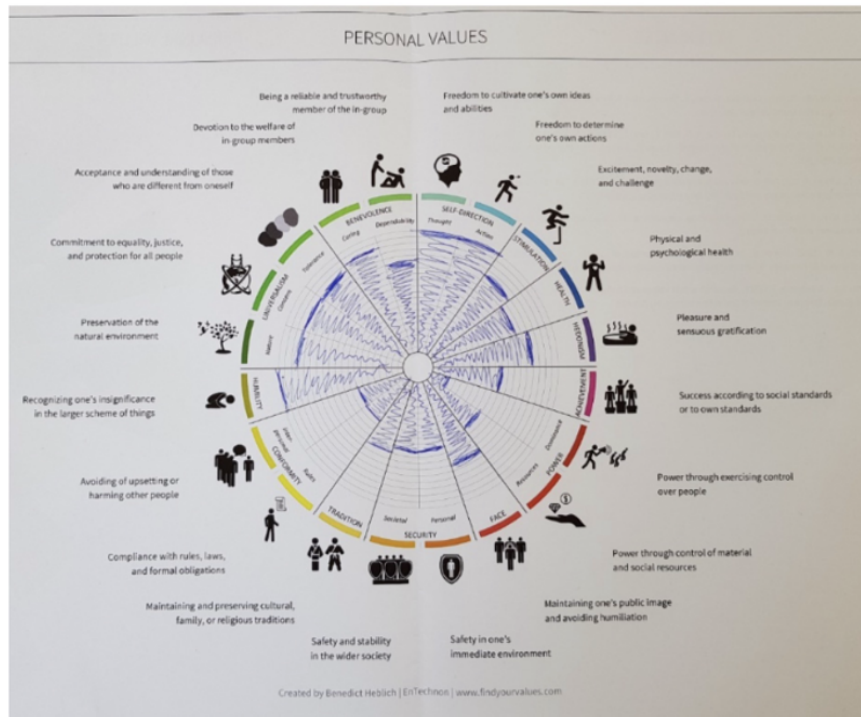
### H.1 Mural Board with guiding steps

The mural board is titled "Startup X" and is divided into several sections:

- Top Left:** A grid of sticky notes and diagrams, likely representing a SWOT analysis or a similar strategic tool.
- Top Right:** A section for problem identification with the heading "Please specify your problem identified in your research on the SDG. You should be able to present the problem statement in 2 minutes max!". It includes fields for "The problem we wish to engage with:", "We identified the following root of the problem:", "As a result, the following effects on people and planet can be assumed:", and "The key facts are:". There is also a "Some questions:" field.
- Bottom Left:** A section titled "Your Idea" with a person icon. It contains a table with columns for "Business", "Market", "Tech", "Team", "Financial", and "Total". The table has 10 rows of data with various numbers and signs.
- Bottom Right:** Three columns of sticky notes under the heading "Problems & Criticism", "Utopia & Visions", and "Options for Realization".
  - Problems & Criticism:** Includes a thumbs-down icon. Notes mention "Electrical cars becoming more common -> huge amount of used batteries need to be disposed in near future.", "a lot of pollution from old batteries", "For off-grid applications the efficiency of current solution is relatively low", "Too many resources are being used (price needed for batteries)", and "Many corporations do not care enough about responsible production".
  - Utopia & Visions:** Includes a smiley face icon. Notes mention "Energy will be generated efficiently in the future", "Having batteries which do not worsen in terms of capacity", "all batteries can be used for a second life cycle", "no need for fossil fuel burning solutions", "Energy storage possibilities with no environmental impact", "batteries are used as long as possible", "Power generation with no environmental impact (CO2 neutral)", and "Help countries to produce more responsibly and sustainably".
  - Options for Realization:** Includes a lightbulb icon. Notes mention "Give batteries a second lifecycle", "Use the batteries that can no longer be used for electric cars, bikes, etc.", "Create new purposes for batteries that can't be used anymore in their original context", and "replace machines with internet-connected engines".

Figure H.1: Mural Board providing the course framework

## H.2 Core competences and personal values template



Name: \_\_\_\_\_  
 Location: \_\_\_\_\_  
 Field of Study: \_\_\_\_\_

**Your knowledge and expertise**

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

**Your Personal Values**

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

**Your most developed skills**

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

**Your Personal Strengths & Talents**

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

Figure H.2: Personal values and core competence template


# **Appendix I**

## **Content Validation Tool**

The content validation tool was adapted and iteratively refined. The version of the presented items may differ from the final version of the item in the questionnaire.

# Your Role

## 1. What is your current status?

[Please choose] 

# Clarity about the Business Idea

Please rate the item using the following scale:

1= not relevant or clear; 2= need some revision; 3= relevant but need minor revision; 4= very relevant or clear

## 2. I have a clear understanding of my Business Idea

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Your comments

## 3. I know my potential customers

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Your comments

**4. I know the problems I want to solve**

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Your comments**

**5. I can easily describe the Business Idea to a friend or partner**

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Your comments**


## Clarity about Personal Values

**Values are trans-situational goals, varying in importance, that serve as guiding principles in the life of a person or group.**

Please rate the item using the following scale:

1= not relevant or clear; 2= need some revision; 3= relevant but need minor revision; 4= very relevant or clear

**6. I know my most important personal values**

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**7. Your comments**

**8. I know what is important to me in my life**

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**9. Your comments****10. I know what motivates me in my life**

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**11. Your comments****12. The Business Idea fits to my Personal Values**

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**13. Your comments****14. I believe that my Personal Values are well reflected in the Business Idea**

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**15. Your comments**

# Clarity about your Competences

**Competence is the the disposition to generate adequate actions to responsibly solve problems in variable situations. This disposition is based on knowledge, skills and attitudes**

Please rate the item using the following scale:

1= not relevant or clear; 2= need some revision; 3= relevant but need minor revision; 4= very relevant or clear

## 16. I know the things I am good at doing

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## 17. Your comments

## 18. I know my most important skills

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## 19. Your comments

## 20. I have professional knowledge that helps me solving relevant problems

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**21. Your comments****22. I know my attitudes towards entrepreneurship**

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**23. Your comments****24. For me it would be easy to realize my Business Idea**

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**25. Your comments****26. I would be able to realize my Business Idea**

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**27. Your comments**



**28. I have the right knowledge to realize my Business Idea**

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**29. Your comments****30. I have the right skills to realize my Business Idea**

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**31. Your comments****32. My Business Idea is attractive to me**

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**33. Your comments****34. I believe that my competences are well reflected in the Business Idea**

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**35. Your comments**

# Awareness about the World's Problems

**Problems are defined as situations or things that need attention and need to be dealt with or solved.**

Please rate the item using the following scale:

1= not relevant or clear; 2= need some revision; 3= relevant but need minor revision; 4= very relevant or clear

## 36. I know the problems mentioned by the SDGs

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## 37. Your comments

## 38. Which three of the 17 SDGs are most important to you?

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## 39. Your comments

## 40. In your opinion, which three SDGs require the most urgent action.

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## 41. Your comments

**42. In your opinion, which three SDGs require the most urgent action.**

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**43. Your comments**

**44. With regard to the business Idea, does the product or service address one of the above mentioned SDGs? (YES/NO); If yes: please write down the SDG addressed by the Business idea\_\_\_\_\_**

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**45. Your comments**

**46. With regard to the Business Idea, how well does the product or service help to meet the SDGs?**

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**47. Your comments**

**48. Please rate the potential impact of the product or service on the environment**

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**49. Your comments****50. Please rate the potential impact of the product or service on the people's well-being**

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**51. Your comments****52. Please rate the potential income generated by the product or service?**

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**53. Your comments****54. How do you estimate the timing for introducing the products/services on the market?**

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**55. Your comments**

**56. How do you estimate the potential demand for the product or service?**

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**57. Your comments**


## Perceived Feasibility of the Business Idea

**Perceived feasibility is defined as the degree to which people consider themselves personally able to carry out certain behaviour.**

Please rate the item using the following scale:

1= not relevant or clear; 2= need some revision; 3= relevant but need minor revision; 4= very relevant/clear

**58. I am confident that I would succeed if I realize my business idea**

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**59. Your comments**

**60. It would be easy for me to realize my business idea**

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**61. Your comments**

# Perceived Desirability of the Business Idea

**Perceived desirability refers to the degree to which he/she feels attraction for a given behaviour**

Please rate the item using the following scale:

1= not relevant or clear; 2= need some revision; 3= relevant but need minor revision; 4= very relevant/clear

## 62. I would love starting my own business based on my business idea

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### 63. Your comments

## 64. I would be very enthusiastic working on my business idea

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### 65. Your comments

## 66. To what extend do you like your Business Idea?

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### 67. Your comments

# Intention to realize your Business Idea

**Intention is defined as the degree to which people want to follow on specific actions**

Please rate the item using the following scale:

1= not relevant or clear; 2= need some revision; 3= relevant but need minor revision; 4= very relevant/clear

## 68. My goal is to become an entrepreneur

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### 69. Your comments

## 70. I am ready to do first steps to realize my business idea

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### 71. Your comments

## 72. If I had the chance, I would create a startup based on my business idea

	1	2	3	4
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clarity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### 73. Your comments

**Last Page**

# Thank you for completing this questionnaire!

We would like to thank you very much for helping us.

Your answers were transmitted, you may close the browser window or tab now.

---

M.A. [Alexander Tittel](#), Karlsruher Institut für Technologie –  
2021



# **Appendix J**

## **Ikigai Questionnaire**



## Print View

Please note that filters and placeholders can not work in the print view. Display of questions that are included via PHP code is limited.

**Tip:** Enable the "print background images" option in the print settings of your browser. Otherwise the browser may incompletely print sliders and custom inputs (or export them incompletely to a pdf).

[Galley-proof](#) [Variable View](#) [Table \(download\)](#)

Filters

PHP Code

Dear Participant,

welcome to the IKIGAI survey and thank you for helping us in our research!

With that research we want to develop an entrepreneurship course design that will help students and entrepreneurs to develop desirable and inspiring business ideas. The survey takes 15-20 min.

Thank you for your contribution!

Alexander Tittel

---

### Data Protection Agreement

The collected data is anonymous and will solely be used for scientific purposes. It will be treated according to legal data protection guidelines and will not be passed on to third parties. In order for us to include you in the study, we require a declaration of consent in accordance with data protection law.

Declaration of consent under the data protection law I agree that my anonymous responses may be collected, processed, and used by the research team at the Institute of Entrepreneurship, Technology Management and Innovation (EnTechnon) at the Karlsruhe Institute of Technology (KIT) for the sole purpose of scientific analyses.

I note that no personal data will be collected. I agree that the anonymized dataset will be published on an aggregate level as part of a scientific publication. I can refuse to give my consent, without detrimental consequences for me, or revoke it at any time with effect for the future. I am hereby informed that the personal data of my person collected within the scope of the above-mentioned purposes will be collected, processed, used, and transmitted in compliance with the German General Data Protection Regulation (GDPR). I have also been informed that the collection, processing, and use of my data are voluntary.

For any questions you can contact the researcher and initiator of this survey [Alexander Tittel](#).

I agree

I do not agree

















## Attitude towards the Business Idea

**14. Referring to the business idea developed in class, please rate the following statements from -5 on the negative side to +5 on the positive side.**

	-5 ..... 0 ..... +5	
Not Attractive		Attractive
Undesirable		Desirable
Not promising		Promising
Meaningless		Meaningful
Boring		Inspiring
Shortsighted		Visionary
Dislikable		Likable

**15. Referring to the business idea developed in class, please indicate your level of agreement with the following statements from 1 (total disagreement) to 7 (total agreement)**

	Strongly disagree	Disagree	Somewhat disagree	Undecided	Somewhat agree	Agree	Strongly agree
After my studies, I would love to realize this business idea	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I had the right team, I would love to realize this business idea	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I could take a semester off, I would love to realize this business idea	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I had a substantial funding, I would love to realize this business idea	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Realizing the business idea would entail great satisfactions for me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
After my studies, I would love to apply for the EXIST Business Start-up Grant to realize my business idea	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Thank you for completing this questionnaire!

We would like to thank you very much for helping us.

Your answers were transmitted, you may close the browser window or tab now.



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