



ENTREPRENEURIAL COMPETENCE TOOL DEVELOPMENT

JOONGSEOB KIM
WAGENINGEN UNIVERSITY & RESEARCH
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Tool development to stimulate and monitor entrepreneurial competence development

Internship report

Author

[Joongseob Kim](#)

joongseob.kim@wur.nl

dorajissanai@nate.com

Registration number 83 02 24 435 040

Course

MSc Internship Track Entrepreneurship

ELS70824

Supervisor

Dr. R (Renate) Wesselink

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Wageningen University & Research

Wageningen, The Netherlands

Summary

I worked for four months in StartHub Wageningen as my entrepreneurial internship. StartHub Wageningen is the start-up incubator and educator for not only current students but also PhD's and recent graduates of Wageningen University & Research. Their core aim is the development of entrepreneurial competences of student entrepreneurs.

The objective of this project was to overcome the four challenges StartHub Wageningen faced. The four challenges were need of collaboration tool, lack of coaching history management, non-existence of common criteria of entrepreneurial competences, and absence of common coaching procedure. To cope with it, I developed the competence tool. The competence tool consists of three components which are incubation track environment, interactive competence information, and coaching process. StartHub Wageningen will start incubation track from early November this year. Hence, StartHub coaches can apply the tool to coaching activities in the incubation track.

Before the tool development, I selected competences from previous scientific articles. Firstly, I extracted 143 entrepreneurial competences from selected literature. Secondly, I merged competences when the competences have the same meaning. Thirdly, I find out the measurability of each competence. Since the methods of measurement are different, I selected EntreComp as a start point because it shows the progress of entrepreneurial competences in eight levels. Finally, I matched related findings from previous studies into EntreComp framework.

I developed three components of the competence tool. First, I set up the incubation track environment which can help communication and development monitoring to entrepreneurs and coaches. I used Microsoft Teams as a platform because of its functional availability and economic benefit. Second, I develop an interactive competence information application. It can help coaches and entrepreneurs to easily access competence information. Third, I develop the coaching process using the EntreComp framework. Coaches will use this process for the coaching activities in incubation track.

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1. Introduction

Evaluating entrepreneurial competences is difficult due to the lack of measurable data and uncertainty. However, there is a way to obtain growing possibility through non-financial information such as the quality of the individual(s) team and vision. My initial attention of the project came from one of the entrepreneurial course 'Competence Management for Building Entrepreneurial Teams' from Wageningen University & Research. I had planned to develop a model to evaluate team qualities regarding previous studies of team learning. However, many single entrepreneurs need help in StartHub Wageningen. Therefore, we moved our direction from 'Team process' to 'Individual Competences (Human capital)' with a mutual agreement in July 2020. Until the middle of the project, I confused the meaning of competency and competence. However, competency and competence are different in the field of human performance technology. The goal of competency is to reproduce the competencies of successful individuals in less successful individuals via assessment, development programs, training, and hiring. In contrast, the desired outcome of competence is providing clear and concise guiding principle to accomplish with distinctly marked and measured milestones through monitoring and coaching (Teodorescu, 2006). Since the goal of the project focus on coaching, goal setting, and monitoring, I used the term competence in this project rather than competency.

StartHub Wageningen

StartHub Wageningen is the start-up incubator and educator for not only current students but also PhD's and recent graduates of Wageningen University & Research. Their core aim is the development of entrepreneurial competences of student entrepreneurs.

They offer a varied program in which entrepreneurs can develop their entrepreneurial competences via not only guiding students from developing a business idea into a real enterprise but also inspirational events and workshops.

I worked with StartHub Wageningen as my entrepreneurial internship. Through information gathering from coaches and entrepreneurs, I recognised four main challenges of the coaching process in StartHub Wageningen. First, there was no collaboration tool to monitor

entrepreneurial progress. Then, coaching activities were stored in the individual inventory of coaches. Second, mentoring contracts are short between 6 months to 1 year. However, mentoring history was not conveyed to successor mentors. Third, there were no common criteria of entrepreneurial competences. Therefore, it was difficult to set a goal and monitor with mutual coaches/mentors together. Four, There was no common coaching procedure. For that reason, although coaches consider focusing on long term development goal, coaching sessions only tended to focus on hands-on coaching tactical, practical aspect.

The research goal of the project is to develop a suitable entrepreneurial competence tool to solve the problems above. The goal is split into three sub research questions:

1. What environment is appropriate to monitor coaching activities with coaches and entrepreneurs without a breach of confidentiality?
2. What can be common criteria of entrepreneurial competences development?
3. What coaching process is effective to guide entrepreneurs not only practical problem solving but also long term entrepreneurial competence development?

Therefore, I developed a tool to answer these questions. This tool which can be continuously enhanced can reduce the time consumption of the reflection process of start-up entrepreneurs. It can be used as a reflection tool for start-up entrepreneurs to know their state. After that, the incubator StartHub Wageningen can use the tool to improve the entrepreneurial competences of entrepreneurs. Also, it can be used as a reference to plan a boost up programs for the start-up entrepreneurs. Consequently, StartHub coaches can apply the tool to coaching activities.

The competence tool consists of three components which are incubation track environment, interactive competence information, and coaching

process (Figure 1).

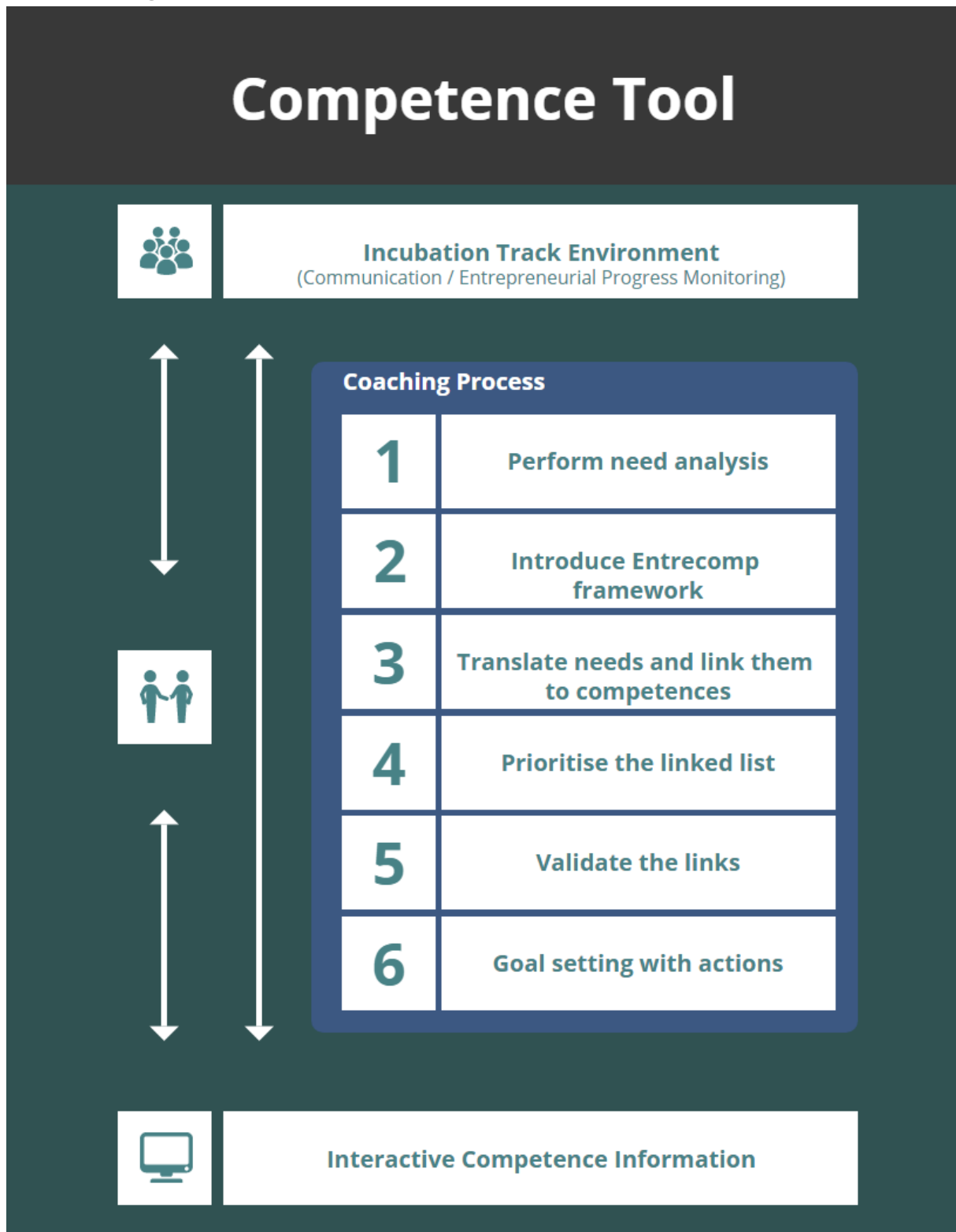


Figure 1 Competence tool components

Incubation Track environment

StartHub Wageningen will start incubation track from November 2020.

Then, entrepreneurs of StartHub Wageningen will be participating in the

incubation track. The track is tailor-made and content-driven. Tailor-made means the incubation track composition is flexible depending on entrepreneurs. Content-driven means StartHub Wageningen use diverse content to improve entrepreneurs. Coaches will coach individual entrepreneurs and coaches will track the progress of entrepreneurs in three aspects. The three aspects are personal/team developments, customer, and technology. Coaches will use the competence tool as the content of the personal development aspect. In other words, coaches can use the environment to recognise the status of the entrepreneur and possible personal improvement. For instance, an entrepreneur describes faced challenges at the first intake. Then, an assigned coach and entrepreneur uses the interactive competence information to find out the linked competences of the challenges of the entrepreneurs. Next, the coach and entrepreneur set a goal together based on the current status of the entrepreneur. Later, a coach can suggest content to improve specific competences. There was no environment for the incubation track yet. Therefore, I set-up the environment using Microsoft Teams. The environment will offer the start-up coach and start-up entrepreneur an easy way to monitor the progress on self-defined goals which has defined in coaching sessions for the purpose of speed-up their personal, customer and technology development.

Interactive competence information

A long list of competences and its descriptions can make entrepreneurs getting lost. This interactive tool makes entrepreneurs find their interesting competences information quickly and easily.

Coaching process

During the coaching activities, entrepreneurs can set a goal to develop entrepreneurial competences and keep track of the progress.

2. Methodology

In this chapter, I describe the method of competence tool development. First, I describe the search terms I used for literature study. Second, I explain how competences are selected. Last, I tell how I developed the three components of the competence tool.

2.1 Search term and literature selection

The literature search performed using a systematic literature search method. The final term has three main concepts which are business, human capital, and meta-analysis. The first search term was used in Scopus and Proquest database. The first search term is described in Table 1. I found 155 articles in Scopus, 140 articles in Proquest. I selected 44 articles based on relevancy and currency.

Table 1 First search term focused on human capital

| | |
|----------------------|--|
| <i>Business</i> | <i>(organisation OR organization OR entrepreneur OR entrepreneurship OR startup OR start-up OR business)</i> |
| | <i>AND</i> |
| <i>Human capital</i> | <i>("human capital" OR "individual competence")</i> |
| | <i>AND</i> |
| <i>Meta analysis</i> | <i>(antecedent OR "meta analysis" OR meta-analysis OR "systematic review")</i> |

After investigation, I have realised that many articles described the relationship between human capital and outcomes such as venture success rather than describing detail competences of human capital. For that reason, I attempted to find competences of entrepreneurs with four main concepts which are business, individual, competence, and meta-analysis. The final search term was used in the Scopus database. The second search term is described in Table 2. Although I found 2535 articles in Scopus, many of the results were medical field related articles. Then, I filtered business-relevant articles only. Also, I investigated articles with the simple term 'Entrepreneur competence' and 'Founder Ability' in two

search engines, Google scholar and Wageningen University & Research Library. Finally, I selected 24 articles focused on individual competences.

Table 2 Second search term focused on individual competences

| | |
|----------------------|--|
| <i>Business</i> | <i>(organisation OR organization OR entrepreneurship OR startup OR start-up OR business)</i> |
| | <i>AND</i> |
| Individual | (individual OR entrepreneur OR founder OR ceo) |
| | <i>AND</i> |
| <i>Competence</i> | (competence OR trait OR skill OR ability OR capability OR quality) |
| | <i>AND</i> |
| <i>Meta analysis</i> | <i>(antecedent OR "meta analysis" OR meta-analysis OR “systematic review”)</i> |

2.2 Competence selection

To select competences, I conducted four steps which are extract, merge, check measurability, and make an agreement. Firstly, I extracted competences from previous scientific studies. Secondly, I merged identical competences from different literature. Thirdly, I conducted an extra literature search to find out measurability of the competences. Finally, through discussions, I convinced coaches to use a set of competences.

2.3 Competence Tool development

Through conversations with coaches and entrepreneurs, I found out what could be a proper environment for coaching activities, effective coaching process, and common criteria for entrepreneurial competence development. I stimulated the use of competences through three main activities. First of all, I set up the incubation track environment. I defined

the core features of the environment through meetings. Then, I selected a suitable platform for incubation track. Secondly, I developed interactive competence information. I developed a web-based interactive application using the JavaScript programming language. This application will be used as a reference in coaching activities at StartHub Wageningen. Finally, I developed an initial version of the coaching process. I designed the coaching process with a coach and conducted the two test coaching sessions.

3. Results

In this chapter, in the first place, I describe what competences were selected. Later, I explain how I used these competences for competence tool development.

3.1 Competence selection

Regarding related literature, 143 entrepreneurial competences which can affect start-up success. I extracted these competences from selected literature (Appendix A: Extracted). Next, I combined similar meaning competences such as independence and autonomy. I refined 62 developable competences, 4 experience competences, and 9 inhibitor competences. After that, I categorise competences into five categories using A Classification Scheme for Learning Outcomes for Training Evaluation (Kraiger et al., 1993).

After several discussions with coaches, I got a suggestion that filters those competences with the existence of the assessment method because if there are no clear criteria, it could be hard to track the progress. I have agreed on the suggestion. Firstly, I searched the measurement method of the individual competences, but I could not obtain considerable results from the search. Secondly, I have searched with the term 'entrepreneurial competence assessment' and following the references and cited articles. Finally, I filtered 57 measurable competences from the previous work (Appendix B: Measurable competences). Many of the previous researches used questionnaire, and the EntreComp only used rubric as a measurement method.

After discussions, we decided to use EntreComp Framework as a starting point. There are three reasons. Firstly, it provides detailed rubrics. Then, entrepreneurs and coaches can scan detailed entrepreneurial competence status. Secondly, it comprehensively covers other competences. For example, systems thinking the idea is mentioned in level 7 of the ‘Identify create and seize opportunities’ thread of ‘Spotting opportunities’ competence. Last but not least, most of the competences except ‘Financial and economic literacy’ are supported by prior relative researches (Table 3).

Table 3 EntreComp Competences and References

| AREA | COMPETENCE | HINT | REFERENCE |
|-------------------------|------------------------|--|--|
| IDEAS AND OPPORTUNITIES | Spotting opportunities | Use your imagination and abilities to identify opportunities for creating value. | (Ahmad, 2007; Makhura, 2011; Man, 2010; Martin et al., 2013; Mourão & Schneider Locatelli, 2020; Tehseen et al., 2020; Unger et al., 2011) |
| | Creativity | Develop creative and purposeful ideas. | (Krueger et al., 2000; Rauch & Frese, 2007; Robles & Zárraga-Rodríguez, 2015; Zarefard, 2018) |

| | | | |
|-----------|----------------------------------|--|---|
| | Vision | Work towards your vision of the future. | (Kyndt & Baert, 2015) |
| | Valuing ideas | Make the most of ideas and opportunities. | (Andreou et al., 2007) |
| | Ethical and sustainable thinking | Assess the consequences and impact of ideas, opportunities, and actions. | (Ahmad, 2007; Ploum, 2018; Tehseen et al., 2020) |
| RESOURCES | Self-awareness and self-efficacy | Believe in yourself and keep developing. | (Ahmad, 2007; Brush et al., 2017; Kyndt & Baert, 2015; Marcolin et al., 2000; Martin et al., 2013; Rauch & Frese, 2007; Robles & Zárraga-Rodríguez, 2015; Tehseen et al., 2020; Zarefard, 2018) |
| | Motivation and perseverance | Stay focused and do not give up. | (Ahmad, 2007; Kerr et al., 2018; Kyndt & Baert, 2015; Makhura, 2011; Mourão & Schneider |

| | | |
|---------------------------------|---|--|
| | | Locatelli, 2020; Rauch & Frese, 2007; Robles & Zárraga-Rodríguez, 2015; Sambasivan et al., 2009) |
| Mobilising resources | Get and manage the resources you need. | (Ahmad, 2007; Andreou et al., 2007; Unger et al., 2011; Zarefard, 2018) |
| Financial and economic literacy | Develop financial and economic know-how. | |
| Mobilising others | Inspire, engage, and get others on board. | (Crook et al., 2011; McCallum & O'Connell, 2009; Pasamar et al., 2019; RezaeiZadeh et al., 2017; Robles & Zárraga-Rodríguez, 2015; Unger et al., 2011; Zarefard, 2018) |

| | | | |
|------------|---|---|---|
| NTO ACTION | Taking the initiative | Go for it. | (Makhura, 2011; Rauch & Frese, 2007; Robles & Zárraga-Rodríguez, 2015) |
| | Planning and management | Prioritise, organise, and follow up. | (Kyndt & Baert, 2015; Makhura, 2011; Mayer-Haug et al., 2013; Mourão & Schneider Locatelli, 2020) |
| | Coping with uncertainty, ambiguity and risk | Make decisions dealing with uncertainty, ambiguity, and risk. | (Ahmad, 2007; McCallum & O'Connell, 2009; Mourão & Schneider Locatelli, 2020; Rauch & Frese, 2007; Robles & Zárraga-Rodríguez, 2015; Sambasivan et al., 2009) |

| | | | |
|--|-----------------------------|--------------------------------------|--|
| | Working with others | Team up, work together, and network. | (al Mamun et al., 2019; Andreou et al., 2007; Gimmon & Levie, 2009; Kyndt & Baert, 2015; Robles & Zárraga-Rodríguez, 2015; Zarefard, 2018) |
| | Learning through experience | Learn by doing. | (Barbaranelli et al., 2003; Brandstätter, 2011; Caprara et al., 1993; Kerr et al., 2018) |

3.2 Competence Tool development

The competence tool consists of three components. These are incubation track environment, interactive competence information, and coaching process.

3.2.1 Incubation track environment

I have defined core functionality in three aspects through meetings with coaches and entrepreneurs for the environment. I listed the core functionality of the content, coaches, entrepreneurs based on the conversations with coaches, and entrepreneurs:

Content

- Easy to find material
- Well-structured and named folders and files
- Interactive
- Integrate with external software

Coaches

- Logbook
- History
- Add canvases (business model canvas, etc)
- Overview

Entrepreneurs

- Easy to fill reports
- Easy to find tools
- Sense of security
- Web access
- Access without WUR account
- Mac user support
- Restricted file access (e.g. only create not delete)

After defining the core functions, the incubation track project team search possible tools to meet functional needs. Since there are plenty of collaboration tools, we have selected a few candidates based on three criteria. First, the tool should cover all core function. Second, the lower learning curve is preferred. Third, the budget of the software should be acceptable, for example, below 200 euro per month. Selected candidates were Brightspace, Microsoft Teams, and Monday. We removed

Brightspace from our candidates because it is difficult to integrate with external software. Finally, we have chosen Microsoft Teams because it fully supports the core functionalities and also it is available without additional cost for StartHub Wageningen.

I investigated Microsoft Teams deeply to set up the incubation track environment on it. There is some limitation, for example, 1000 GB storage capacity available for the entire team and each team can only have a maximum of 30 private channels. Nonetheless, every function works smoothly. Therefore, I set up a pilot environment for an event called Realisation Bootcamp. In the pilot environment, coaches and entrepreneurs tested the Microsoft Teams environment. I have collected challenges while using the environment and improved user manual and FAQ. Now, I set up the incubation track environment.

3.2.2 Interactive competence information

StartHub Wageningen coaches agreed to use EntreComp for coaching environment. Although I intended to use EntreComp to assess the competence status of entrepreneurs for the first time, I recognise that coaches rather want to use EntreComp as a guideline. Since the full EntreComp document has 39 pages, it is difficult to navigate the description and proficiency framework of the needed competence quickly. After I provided the full document to two entrepreneurs, an entrepreneur said he wrote down his proposal until 3:00 AM, and he should finish another proposal the next day. When he opened the EntreComp document, he felt difficult to obtain essential information quickly because of the amount of the information. For easy access information, I have developed a web-based interactive EntreComp competence information tool using Vue.js JavaScript framework. Therefore, coaches and entrepreneurs can effortlessly navigate specific competences. Also, it is easily accessible through a tab of Microsoft Teams.

I have investigated four programmings which are languages which are Python, Ruby, Golang, and Javascript. Python has a stable Input/Output(IO) library pandas (<https://py0070i.org/project/pandas/>) and other mature libraries can be used. Ruby also has mature libraries for IO and other functions. Ruby and Python have strength on web

application development. Golang has libraries for reading specific file types, but relatively there are fewer libraries available than others. Golang has a performance advantage. Javascript has libraries for IO and has a strong community. Javascript also has flexibility. Through an interview with a coach, I have clarified target user of the tool. This tool will be used by StartHub Wageningen coaches and entrepreneurs. They use Microsoft Windows as an operating system. Also, coaches prefer to integrate the tool into an incubation track environment. Finally, I choose Javascript as a development language of the tool because of its flexibility.

The Interactive EntreComp is published on the web. People can choose a competence they want to obtain detailed information. Figure 2 represents how it looks like. People can access the Interactive EntreComp via the link below:

<https://dorajistyle.github.io/EntreComp/>

One of the authors of EntreComp framework commented on the Interactive EntreComp that it definitely improves readability and removes a barrier to the begin of the framework.

The Entrepreneurship Competence framework

At its very simplest level, EntreComp is made up of 3 competence areas: **Ideas & Opportunities**, **Resources**, and **Into Action**. Each area contains 5 competences, and together these make up the 15 competences that individuals use to discover and act upon opportunities and ideas.

There is no single core competence in EntreComp and the competences are of equal importance. The competences are numbered to allow ease of reference, but the order in which they are presented does not imply a sequence in the acquisition process or a hierarchy. Learning activity or development tool may address only 1 competence, or develop all 15 competences.



FIGURE 2 PART OF THE INTERACTIVE COMPETENCE INFORMATION

3.2.3 Coaching process

As the EntreComp framework provides detailed information, it takes a long time to find where the entrepreneurs are. To reduce the time of reflection, we asked coaches to select the most important competences for entrepreneurs who participate in the incubation track. The selection procedure conducted in three stages. Firstly, a competences selection survey was developed and improved through feedback from StartHub Wageningen team members. I decided not to use competences in 'Ideas & Opportunities' area for the survey because most of the entrepreneurs who participate in the incubation track already in pursuing stage.

Secondly, I collected the results of the survey from four coaches. They show a similar perspective on low ranked competences such as 'Mobilising others' and 'Financial and economic literacy'. However, they

showed a diverse perspective on other competences (Table 4). Also, I asked an additional question for their coaching availability. They answered that they can fully develop most of the competences for the entrepreneurs. However, they can develop up to advanced level on ‘Coping with uncertainty, ambiguity and risk’, ‘Motivation and perseverance’, and ‘Mobilising others’ competences.

Table 4 Competence rank by coaches (green: high rank, orange: low rank)

| Ran k | Competence | Coach 1 | Coach 2 | Coach 3 | Coach 4 |
|----------|---|------------|------------|------------|------------|
| 1 | Coping with uncertainty, ambiguity and risk | 1 | 1 | 4 | 8 |
| 2 | Self-awareness and self-efficacy | 2 | 4 | 2 | 7 |
| 3 | Taking the initiative | 6 | 6 | 1 | 2 |
| 4 | Working with others | 4 | 2 | 5 | 6 |
| 5 | Mobilising resources | 3 | 8 | 6 | 5 |
| 6 | Learning through experience | 9 | 3 | 7 | 3 |
| 7 | Motivation and perseverance | 5 | 5 | 3 | 10 |
| 8 | Planning and management | 10 | 7 | 9 | 1 |
| 9 | Mobilising others | 7 | 9 | 8 | 4 |
| 10 | Financial and economic literacy | 8 | 10 | 10 | 9 |

After the survey, I organised a joint discussion with the four coaches who participated in the survey. Selecting the three most important competences were controversial because the importance may vary depends on the situation of entrepreneurs. For that reason, I devise a coaching process using EntreComp with a coach of StartHub Wageningen.

The first version of the coaching session process:

1. Introduce EntreComp framework to an entrepreneur by a coach.
2. Pick one competence from each area by the entrepreneur.
3. Conduct self-assessment by the entrepreneur.

4. Show evidence of the self-assessment to coach by the entrepreneur.
5. Set a development plan for the competences.
6. Iterate session to check progress.

We conducted a test coaching session with an entrepreneur using the process. The entrepreneur gets lost during the session because he did not find a clear relationship between the competences and the challenge he faces now. Also, he thought, some of the competences he does not want to develop because he thinks he has sufficient availability on the 'Ideas & Opportunity' area. Then, he wants to focus on the 'Into Action' area. He said that sometimes he is hard to stick to a plan. Someone who has over availability on 'Ideas & Opportunities' area can stick to discover the new idea. For that reason, there is less available to stick to a plan. In fact, all three areas are related. Hence, the balance between the three areas is important.

After the first test session, I improved the process using feedback of the first test session. Later, I used the process for the second test coaching session. The entrepreneur can link his problem with the competences. After that, the coach asked him what is the top priority. Then, the entrepreneur selected two linked items as top priorities (Table 5). The coach bundled the two links as a resource linked problem based on the explanation of the entrepreneur. When the entrepreneurs delegate his tasks to others properly, he could focus on other tasks. The improved coaching process works properly in the second test session.

Table 5 Competence - Problem Links (Green: Top priority)

| Competence | Problem |
|----------------------|---|
| Mobilizing resources | I can identify the key resources needed to support an innovative idea or opportunity to develop an existing business, launch a new venture, or initiate a social enterprise but sometimes I can't allocate enough them easily and in the earliest time. |

| | |
|---|--|
| Financial & Economic literacy | I have taxation problem and lack of knowledge about how my financial decisions (investments, buying assets, goods and so on) affect my tax. |
| Financial & Economic literacy | Due to unfamiliarity with the value of the money and cost in the Netherlands, as a foreign entrepreneur sometimes I cannot make proper budgeting and therefore afraid to put a price on my idea/product/service. |
| Planning & Management | Setting goal is very dependent on the personality, optimistic vision, network and team. Sometimes I set some goals based on my optimistic vision and ambition but due to lack of effective network and resources, they won't happen at that time. It is one of the drawbacks for foreign entrepreneurs. |
| Coping with uncertainty, ambiguity & Risk | I need to learn to assess the risks for my venture in different situations and also to assess that from the point of view of an investor. |
| Working with others | I can build a team based on the individual knowledge, skills and attitudes of each member, but I have seen that sometimes due to lack of confidence as a foreigner who is unfamiliar with the ecosystem and also with startup visa, I have given too many rights to my teammate/partners just to keep them attractive for collaboration. Also, sometimes partnership starts but partners lose their interest. It is a big challenge to find the right match. |

After the second test coaching session, I arranged the coaching process. Then introduced this process to the coaches. They said it is an explorative and co-creational process between coach and entrepreneurs. It can show a problem more clearly. Since coaches have limited resource, it is difficult to decide on two coaching focus together. The first focus is a long term development goal which means what is the next stage. The

second focus is hands-on coaching which is tactical and practical. Because of their limited resources, coaches are considering to involve external coaches. One of external mentor already gave positive feedback on the idea to use EntreComp framework while mentoring. Of course, the coaching process may develop continuously through a reflective coaching process. Still, it is a good starting point of coaching session using EntreComp framework.

Coaching process (Intake):

1. Perform Need analysis (What problem you faced?) by coach, entrepreneur
2. Introduce EntreComp framework by coach
3. Translate needs and link them to competences by entrepreneur
4. Prioritise the linked list by entrepreneur
5. Validate the links and by coach. (e.g. ask evidence of competence level of entrepreneurs)
6. Goal setting with actions (How to balance, develop, maintain the competences for the following X period; What actions will you do for it?)

Coaching process (Following sessions):

1. Check the progress by an agreed development plan, not by rubric. (What actions did you complete?)
2. Adjust goals

Sometimes entrepreneurs have downtime which is not able to develop the competences even they needed because of their situation. That is because if there are high priority actions for their business, there is no room for competence development. In coaching sessions, coaches and entrepreneurs should discuss the downtime which entrepreneurs could not participate in the competence development process.

4. Conclusion and discussion

During the project, I struggled to solve the four challenges StartHub Wageningen faced. The four challenges were the need of collaboration tool, lack of coaching history management, non-existence of common criteria of entrepreneurial competences, and absence of common coaching procedure. To cope with it, I developed the three components of the competence tool.

Using the tool, StartHub Wageningen can set a goal based on the current status of entrepreneurs. Also, continuously monitor the achievement. Therefore, StartHub Wageningen coaches can apply the tool to achieve the goals of the entrepreneurs. The competence tool is a supporting tool to guide entrepreneurs. It can firstly be used in the analysis stage and entrepreneurs can link their challenges to the competences together with their coach. Coaches and entrepreneurs set goals and monitor long-term progress with the following coaching sessions. The goals and focusing competences may vary based on the situation of the entrepreneurs. The three-part of the tool are working together. First, entrepreneurs and coaches can find competence information from interactive competence information. Second, entrepreneurs can show progress during coaching sessions. Finally, the progress of entrepreneurs will be recorded in the incubation track environment.

Even though I developed the tool for the StartHub Wageningen, the process not yet used in the real world. The tool can be improved by experiences and long-term monitoring because the needs of entrepreneurs are diverse depends on their fields and situation. Therefore, through the continuous usage of the tool, coaches could recognise a more efficient way to apply it. Finally, the tool could be a bespoke tool regarding the characteristics of entrepreneurs. I assume this tool can help the long-term development of entrepreneurial competences, but data acquisition of the competence development needs time. As entrepreneurs set goals during coaching sessions, StartHub Wageningen could monitor the goal counts, the success rate of the goals, and duration of the goal completion. Furthermore, many of the competences difficult to check progress quantitatively. Perhaps, 360-degree feedback could help to monitor a reliable entrepreneurial competences development progress. Although StartHub Wageningen also can use business success as a proxy of competence development, it is

difficult to say the competences are the critical influence factor to success.

Nonetheless, I believe the competences are still important for entrepreneurs. Some of the competences such as 'Coping with Uncertainty, Ambiguity & Risk' are hard to develop in the short term because it needs experiences. However, some of the competences such as 'Financial Literacy' can be improved by participating courses and skill development in a relatively short time frame. When entrepreneurs set a goal with their priority and continuously aware of what competences can help their situation, it could affect business success.

Future research may identify the relationship between business success and entrepreneurial competences from EntreComp. Furthermore, if academic analyse training time to develop each competence, entrepreneurs can set a goal with a reliable time frame.

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Appendices

Appendix A: Extracted competences

| Competence | References |
|-------------------------------|------------------------|
| Build trust | (Andreou et al., 2007) |
| Shared experiences | (Andreou et al., 2007) |
| Help anchors | (Andreou et al., 2007) |
| Networking opportunities | (Andreou et al., 2007) |
| Shared interests | (Andreou et al., 2007) |
| Advise | (Andreou et al., 2007) |
| Guidance | (Andreou et al., 2007) |
| Peer review/informal feedback | (Andreou et al., 2007) |
| Influence | (Andreou et al., 2007) |
| Mentoring | (Andreou et al., 2007) |
| Recommendations | (Andreou et al., 2007) |
| Ideas | (Andreou et al., 2007) |
| Support | (Andreou et al., 2007) |
| Excitement | (Andreou et al., 2007) |
| Motivation | (Andreou et al., 2007) |
| Strength | (Andreou et al., 2007) |
| Reassurance | (Andreou et al., 2007) |
| Validation | (Andreou et al., 2007) |
| Drive | (Andreou et al., 2007) |
| Subject-matter knowledge | (Andreou et al., 2007) |
| Know-how | (Andreou et al., 2007) |
| Lessons learned | (Andreou et al., 2007) |
| Technical requirements | (Crook et al., 2011) |

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| Office politics | (Andreou et al., 2007) (Andreou et al., 2007) |
| Experience | (Andreou et al., 2007) |
| Job rotation opportunities | (Andreou et al., 2007) |
| Complementary skills | (Andreou et al., 2007) |
| Mixed skills | (Andreou et al., 2007) |
| Experts | (Asiaei & Jusoh, 2015) |
| Specialists | (Asiaei & Jusoh, 2015) |
| organizational culture | (Rasmussen et al., 2011) |
| Trust | (Vafeas et al., 2016) (Vafeas et al., 2016) |
| Inadequate experiential knowledge | (Vafeas et al., 2016) |
| Inadequate skills / ability | (Ballout, 2007) |
| Static mental models | (Crook et al., 2011) |
| Education level | (Ballout, 2007) (Ballout, 2007) |
| Work investment | (Crook et al., 2011) |
| Work experience | (Ballout, 2007) (Crook et al., 2011) |
| Number of hours worked | (Crook et al., 2011) |
| Cognitive ability | (Pasamar et al., 2019) |

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|---|-----------------------|
| Leadership capabilities | (Crook et al., 2011) |
| Internal capabilities | (Crook et al., 2011) |
| IT knowledge | (Crook et al., 2011) |
| Selling skills and collaborative skills | (Crook et al., 2011) |
| Knowledge stock | (Crook et al., 2011) |
| Self patent citations | (Crook et al., 2011) |
| Start-up experience | (Martin et al., 2013) |

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|---|--|
| International experience | (Martin et al., 2013) |
| Knowledge of entrepreneurship and entrepreneurial process | (Martin et al., 2013) |
| Competence in identifying innovative business opportunities | (Martin et al., 2013) |
| Competence in dealing with ambiguity in decision making | (Martin et al., 2013) |
| Attitudes towards entrepreneurship | (Martin et al., 2013) |
| Desirability of becoming an entrepreneur | (Martin et al., 2013) |
| Feasibility of becoming an entrepreneur | (Brush et al., 2017) |
| self-efficacy related to entrepreneurship | (Martin et al., 2013) (Unger et al., 2011) |
| intentions to start a business | (Gimmon & Levie, 2009) |
| education or work experience | (Peña, 2002) (Unger et al., 2011) (Unger et al., 2011) |
| Knowledge and skills | (Unger et al., 2011) |

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|--|---|
| environmental scanning | (Unger et al., 2011) |
| selecting opportunities | (Unger et al., 2011) |
| formulating strategies for exploitation of opportunities | (Unger et al., 2011) |
| organization | (Unger et al., 2011) |
| leadership | (Unger et al., 2011) |
| management | (Unger et al., 2011) |
| being unemployed or out of the labor force before or during starting up a firm | (Brixy & Hessels, 2010) |
| higher number of sources of advice | (Brixy & Hessels, 2010) |
| being specialist | (Brixy & Hessels, 2010) |
| Mixed motivation | (Peña, 2002) (Brixy & Hessels, 2010) |
| Entrepreneurial mind-set | (Gimmon & Levie, 2009) |
| General management experience | (Gimmon & Levie, 2009) |
| Founders' team compatibility | (Gimmon & Levie, 2009) |
| Learning ability | (McCallum & O'Connell, 2009) |
| Start-up experience | (McCallum & O'Connell, 2009) |
| Leading employees | (McCallum & O'Connell, 2009) |
| Building and mending relationships | (McCallum & O'Connell, 2009) |
| Risk-taking, innovation | (McCallum & O'Connell, 2009) |
| Change management | (McCallum & O'Connell, 2009) |
| Influence, leadership, power | (McCallum & O'Connell, 2009) |
| Communicating information, ideas | (Krueger et al., 2000) |

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| Taking action, making decisions, following through | (Sambasivan et al., 2009) |
| optimism | (Krueger et al., 2000) (Ireland et al., 2009) |
| creativity | (Mayer-Haug et al., 2013) |
| pro-entrepreneurship cognitions | (Rauch & Frese, 2007) |
| Planning | (Kerr et al., 2018) |
| Need for achievement (Achievement motivation) | (Rauch & Frese, 2007) (Rauch & Frese, 2007) |
| Generalized self-efficacy | (Rauch & Frese, 2007) |
| Innovativeness | (Rauch & Frese, 2007) |
| Stress tolerance | (Rauch & Frese, 2007) |
| Need for autonomy | (Rauch & Frese, 2007) |
| Proactive personality | (Kerr et al., 2018) |
| Internal locus of control | (Rauch & Frese, 2007) (Sambasivan et al., 2009) |
| Risk-taking (Risk propensity) | (Brandstätter, 2011) (Kerr et al., 2018) |
| Openness to experience | (Brandstätter, 2011) (Kerr et al., 2018) |
| Conscientiousness | (Brandstätter, 2011) (Kerr et al., 2018) |
| Extraversion | (Brandstätter, 2011) (Kerr et al., 2018) |
| Agreeableness | (Brandstätter, 2011) (Kerr et al., 2018) |
| Neuroticism | (RezaeiZadeh et al., 2017) (RezaeiZadeh et al., 2017) |

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| Productive thinking | (Sambasivan et al., 2009) |
| Motivation competences | (RezaeiZadeh et al., 2017) (RezaeiZadeh et al., 2017) |
| Interpersonal skills | (Rasmussen et al., 2011) |
| Managerial and leadership competences | (Rasmussen et al., 2011) |
| Opportunity refinement competence | (Rasmussen et al., 2011) |
| Leveraging competence | (Kyndt & Baert, 2015) |
| Championing competence | (Kyndt & Baert, 2015) |
| Perseverance | (Kyndt & Baert, 2015) |
| Self-knowledge | (Kyndt & Baert, 2015) |
| Orientation towards learning | (Kyndt & Baert, 2015) |
| Awareness of potential returns on investment | (Kyndt & Baert, 2015) |
| Decisiveness | (Kyndt & Baert, 2015) |
| Planning for the future | (Sambasivan et al., 2009) |
| Independence | (Kyndt & Baert, 2015) (Kyndt & Baert, 2015) |
| Building networks | (Kyndt & Baert, 2015) |
| Ability to persuade | (Kyndt & Baert, 2015) |
| Seeing opportunities | (Kyndt & Baert, 2015) |
| Insight into the market | (Robles & Zárraga-Rodríguez, 2015) |
| Social & environmentally conscious conduct | (Robles & Zárraga-Rodríguez, 2015) |
| Risk assumption | (Robles & Zárraga-Rodríguez, 2015) |
| Initiative | (Robles & Zárraga-Rodríguez, 2015) |
| Leadership | (Robles & Zárraga-Rodríguez, 2015) |

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| Teamwork | (Robles & Zárraga-Rodríguez, 2015) |
| Responsibility | (Robles & Zárraga-Rodríguez, 2015) |
| Autonomy / self-determination | (Robles & Zárraga-Rodríguez, 2015) |
| Self -confidence | (Robles & Zárraga-Rodríguez, 2015) |
| Integrity | (Robles & Zárraga-Rodríguez, 2015) |
| Negotiation | (Robles & Zárraga-Rodríguez, 2015) |
| Dynamism | (Robles & Zárraga-Rodríguez, 2015) |
| Communication | (Robles & Zárraga-Rodríguez, 2015) |
| Troubleshooting | (Robles & Zárraga-Rodríguez, 2015) |
| Innovation | (Robles & Zárraga-Rodríguez, 2015) |
| Search and analysis of information | (Sambasivan et al., 2009) |
| Results orientation (goal orientation) | (Robles & Zárraga-Rodríguez, 2015) (Robles & Zárraga-Rodríguez, 2015) |
| Change management | (Gümüşay & Bohné, 2018) |
| Quality of work | (Gümüşay & Bohné, 2018) |
| Dis- & misconnection | (Gümüşay & Bohné, 2018) |
| Distance | (Gümüşay & Bohné, 2018) |
| Non-access | (Gümüşay & Bohné, 2018) |
| Non-integration | (Gümüşay & Bohné, 2018) |
| Mistrust | (Deste et al., 2012) |

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|---|----------------------|
| Skepticism | (Deste et al., 2012) |
| Scientific excellence | (Deste et al., 2012) |
| Combining multiple bodies of knowledge | (Deste et al., 2012) |
| Prior invention experience | (Deste et al., 2012) |
| Collaboration with users and networking | (Deste et al., 2012) |

Appendix B: Measurable competences

| Competence | How to measure | Measurement Reference |
|---|------------------------|--|
| Proactive personality (Initiative) | Questionnaire / Rubric | (Bacigalupo et al., 2016; Makhura, 2011) |
| Risk-taking (Risk propensity) | Questionnaire / Rubric | (Ahmad, 2007; Bacigalupo et al., 2016; Mourão & Schneider Locatelli, 2020) |
| Openness to experience | Questionnaire / Rubric | (Bacigalupo et al., 2016; Barbaranelli et al., 2003; Caprara et al., 1993) |
| Conscientiousness | Questionnaire | (Barbaranelli et al., 2003; Caprara et al., 1993) |
| Extraversion | Questionnaire | (Barbaranelli et al., 2003; Caprara et al., 1993) |
| Agreeableness | Questionnaire | (Barbaranelli et al., 2003; Caprara et al., 1993) |
| Neuroticism | Questionnaire | (Barbaranelli et al., 2003; Caprara et al., 1993) |
| Independence (Autonomy) | Questionnaire | (Mourão & Schneider Locatelli, 2020) |
| Social & environmentally conscious conduct | Questionnaire | (Ahmad, 2007) |
| Generalized self-efficacy | Questionnaire / Rubric | (Bacigalupo et al., 2016; Zarefard, 2018) |
| Need for achievement (Achievement motivation) | Rubric | (Bacigalupo et al., 2016) |

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| Innovativeness | Questionnaire | (Man, 2010; Zarefard, 2018) |
| Identifying innovative business opportunities | Questionnaire / Rubric | (Ahmad, 2007; Bacigalupo et al., 2016; Makhura, 2011; Man, 2010; Mourão & Schneider Locatelli, 2020; Tehseen et al., 2020) |
| Formulating strategies for exploitation of opportunities | Questionnaire | (Ahmad, 2007; Makhura, 2011; Man, 2010; Tehseen et al., 2020) |
| Creativity | Questionnaire / Rubric | (Bacigalupo et al., 2016; Zarefard, 2018) |
| Self-knowledge | Questionnaire | (Ahmad, 2007; Man, 2010; Tehseen et al., 2020) |
| Planning | Questionnaire / Rubric | (Bacigalupo et al., 2016; Makhura, 2011; Mourão & Schneider Locatelli, 2020) |
| Technical requirements | Questionnaire | (Ahmad, 2007; Zarefard, 2018) |
| Leadership | Questionnaire / Rubric | (Bacigalupo et al., 2016; Zarefard, 2018) |
| Leading employees | Questionnaire | (Ahmad, 2007) |
| Building and mending relationships | Questionnaire | (Ahmad, 2007; Man, 2010) |
| Founders' team compatibility (Teamwork) | Rubric | (Bacigalupo et al., 2016) |
| Learning ability | Questionnaire | (Ahmad, 2007; Man, 2010; Tehseen et al., 2020) |
| Championing competence (Ability to persuade) | Questionnaire | (Makhura, 2011; Mourão & Schneider Locatelli, 2020) |
| Building networks | Questionnaire | (al Mamun et al., 2019; Zarefard, 2018) |
| Quality of work | Questionnaire | (Makhura, 2011; Mourão & Schneider Locatelli, 2020) |
| commitment | Questionnaire | (Ahmad, 2007; Makhura, 2011; Man, 2010; Mourão & Schneider Locatelli, 2020) |

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|----------------------------------|------------------------|--|
| Conceptual | Questionnaire | (Ahmad, 2007; Tehseen et al., 2020) |
| Ethical | Questionnaire / rubric | (Ahmad, 2007; Bacigalupo et al., 2016; Tehseen et al., 2020) |
| Persistence | Questionnaire | (Makhura, 2011; Mourão & Schneider Locatelli, 2020) |
| Information seeking | Questionnaire | (Makhura, 2011) |
| Efficiency orientation | Questionnaire | (Makhura, 2011) |
| Problem solving | Questionnaire | (Makhura, 2011) |
| Self confidence | Questionnaire | (Makhura, 2011) |
| Assertiveness | Questionnaire | (Makhura, 2011) |
| Familism | Questionnaire | (Tehseen et al., 2020) |
| Vision | Rubric | (Bacigalupo et al., 2016) |
| Valuing ideas | Rubric | (Bacigalupo et al., 2016) |
| Mobilising resources | Rubric | (Bacigalupo et al., 2016) |
| Financial and economic literacy | Rubric | (Bacigalupo et al., 2016) |
| Analytical competences | Questionnaire | (Man, 2010) |
| Operational competences | Questionnaire | (Man, 2010) |
| Entrepreneurial skills (ES) | Questionnaire | (al Mamun et al., 2019) |
| Market orientation (MO) | Questionnaire | (al Mamun et al., 2019) |
| Sales orientation (SO) | Questionnaire | (al Mamun et al., 2019) |
| Entrepreneurial competences (EC) | Questionnaire | (al Mamun et al., 2019) |
| Enterprise performance (EP) | Questionnaire | (al Mamun et al., 2019) |
| Administrative Competence | Questionnaire | (Zarefard, 2018) |
| Entrepreneurial Attitude | Questionnaire | (Zarefard, 2018) |

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|----------------------|---------------|--------------------------------------|
| Goals' definition | Questionnaire | (Mourão & Schneider Locatelli, 2020) |
| Search for data | Questionnaire | (Mourão & Schneider Locatelli, 2020) |
| Diversity | Questionnaire | (Ploum, 2018) |
| Foresighted thinking | Questionnaire | (Ploum, 2018) |
| Systems thinking | Questionnaire | (Ploum, 2018) |
| Interpersonal | Questionnaire | (Ploum, 2018) |
| Normative | Questionnaire | (Ploum, 2018) |
| Strategic Action | Questionnaire | (Ploum, 2018) |