

A literature-based approach to improving the digital matchmaking tool
of BedrijvenWijzer

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Management Summary

Introduction

The BedrijvenWijzer is a digital matchmaking tool aimed to match and introduce job or (graduation) internship seeking students in the region of Twente to local companies and organizations. It is aimed to be an answer to the problem that highly educated students tend to leave the region as soon as they graduate, disregarding the companies in the region as options. While of course some economic factors could drive such a decision for students, staying is often not even regarded as an option. This is seen as a problem that has two main dimensions; on the one hand companies are not really on the students' radar on the other hand students tend to have the prejudice that there are no exciting, fun or interesting jobs in the region of Twente.

Through a quick, easy to use and interesting matchmaking tool, the BedrijvenWijzer aims to match students with suitable companies and organizations in the region to ensure that these companies and organizations appear more frequently on the students' radar and to fight the prejudice that companies in the region are not fun, interesting or exciting. The tool works through the comparison of answers to questionnaires that are both taken from students and companies. The questions in these questionnaires were aimed to measure some part of the constructs of personality and company culture. BedrijvenWijzer pointed out however that they were unsure whether the constructs, indicators and measures were actually the best to use. Next to that there were some factors in the computation of the matches that compromised the validity of the measures such as the use of arbitrary and subjective weights. Therefore, this thesis aims to select a theory supported set of indicators and to methodologically design measures for these indicators on both the students and the company side. This should be done in a way that refrains from the use of predefined and ambiguous weights and allows for an implementation that is intriguing for students, not time consuming and allows for participating companies to be more visible to students.

Literature

From literature, two main findings were obtained. The first one showed that a having a 'good' match for student and company would mean that; (i) the company desired skills and study backgrounds of the student are met, that (ii) the desired employment type of the student, such as a job, side-job, internship, bachelor or master graduation assignment, are met by the availability of that employment type at the company, and that (iii) the match is based on indicators that would predict the extent to which the student will be interested in, and open to contact with the company and that predict how well the student would fit into the work environment that the company can provide, such that an eventual job, internship or assignment at the company would be likely to result desirable outcomes such as high job satisfaction, performance, commitment, personal well-being and retention.

The second finding is that the compatibility between an individual and their work environment is captured in the conceptualization of *person-environment fit*. This *person-environment fit* is composed of different fit perspectives such as *person-organization fit*, *person-group fit*, *person-vocation fit* and *person-job fit* which each represent the compatibility between the individual and a specific facet of the work environment. These types of fit have each been shown to have a significant positive relation to one or more beneficial work attitudes such as organizational attraction, job satisfaction, job performance, organizational commitment, personal well-being and job retention. It was therefore decided that the level of fit should be the central determinant in the matchmaking score in the BedrijvenWijzer. This was solidified in the main research question; *How can the most relevant indicators of fit between students and regional companies be measured efficiently and effectively and applied in a digital matchmaking tool?*

Approach

Since fit is a big construct with many conceptualizations and measurements the first order of business was to create an overview in a framework which could be used to select contextually relevant indicators for the BedrijvenWijzer. Since such a framework did not yet exist it was constructed in this thesis. The resulting framework has been shown to have multiple implications in different contexts. But, focusing on the context of the BedrijvenWijzer, it was used to select a set of potentially relevant and important indicators. These indicators were scored to a set of criteria to find which of them were the most contextually relevant. With this the first part of the main research question would be answered as the most relevant indicators of fit between students and companies would be known.

Then, through the construction of alternative measures according to a set of requirements for the five most important indicators and through the exploration of different matchmaking methods, the second part would be answered as that would yield an efficient and affective way of measuring the indicators and applying them into a digital matchmaking tool.

Results

The most contextually relevant indicators were found to be *personality congruence, knowledge, skills and abilities (KSAs) demand-abilities fit, value congruence, growth opportunities needs-supplies fit* and *time demand abilities fit*. For each of these indicators an objective measure was created which could be implemented into the BedrijvenWijzer. It was reasoned that a distinction should be made between those indicators that should form preselection criteria which should decide which students and companies should be allowed to be a match, and indicators that should determine the matchmaking score to decide how compatible students and companies are. The preselection indicators would be *KSAs demand-abilities fit* and *time demand-abilities fit*. The former to disregard students with unrelated study backgrounds and the latter to disregard students looking for a different kind of employment type.

In terms of application into a digital matchmaking tool, it was found that the indicators which determine the matchmaking score could be measured both objectively and subjectively. Objective measurement could be done through the computation of a similarity score for each indicator and combining those into one matchmaking score. Playfulness can then be added through the addition of creative scale descriptions in the questions to make the tool more attractive to students. Subjective measurement could be done for example through letting the companies provide company specific information on each of the indicators and then allowing the students to judge their level of attraction or compatibility with those companies on these indicators.

The perks of objective measurement include that it is easier to implement due to the similarity with the current version of the BedrijvenWijzer, that it is less prone to prejudice and that it takes less time to fill in. Next to that, a resulting profile can give students more insights into themselves.

The perks of subjective measurement include that is often argued to better predict the positive work attitudes related to fit, that it is more playful in nature, intuitive to students as they are familiar with similar matchmaking tools such as Tinder and allows for more companies to be visible and therefore on the radar of participating students.

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1. Introduction

1.1 An introduction to BedrijvenWijzer

BedrijvenWijzer is a young spin-off initiative based in Enschede's Kennispark. BedrijvenWijzer was introduced with the purpose of addressing the problem that many companies based in the region of Twente are faced with; talent, that should be easily accessible through the educational institutions in the region like the University of Twente and Saxion, tends to disregard the career options available within the region. Instead, talent from these institutions too often pursues career opportunities elsewhere, making the recruiting of suitable, capable and talented young professionals very difficult. Despite the obvious economical and cultural motivations that students might have to leave this region, students tend to largely disregard working in the region as an option. This problem has two dimensions; on the one hand companies are not really on the students' radar on the other hand students tend to have the prejudice that there are no exciting, fun or interesting jobs there.

The solution that the founders of BedrijvenWijzer proposed was to develop an accessible, interesting, quick and easy-to-use data driven matchmaking tool that matches students looking for an internship, job or a bachelor or master assignment with suitable companies in the region of Twente. This matchmaking is done using an algorithm that uses data to compose and compare profiles that show a company's or student's preferences concerning expertise, industry, company culture and personal attributes. The data necessary for this algorithm is presently gathered using two different methods. Employees of companies determine their company culture and desired personality traits through a workshop provided by BedrijvenWijzer to the company. Student data on the other hand, is collected through a short, web-based questionnaire.

1.2 Identifying the problem

1.2.1 An introduction to the problem

As BedrijvenWijzer is scaling up, questions still exist as to how effective the matchmaking tool will actually be. While initial data and feedback from the pilot was largely positive, companies indicate that, for now, matches do not yield a lot of added value. Even though participating companies undeniably gain some visibility among students, mismatches between supply of students and demand of available positions within the companies are frequent. Furthermore, there is no registered successful placement of a student at a company after a match. It is therefore difficult to determine whether the matchmaking based on the fit between student and company based on personal traits and company culture is actually effective. While the problem of mismatching based on the availability of positions within the companies is already being addressed, there is still believed to be room for improvement when it comes to the matchmaking and its used indicators.

1.2.2 Defining the action problem

Even though there is some data available as to how the companies that participated in the pilot perceived the added value and effectiveness of the matchmaking tool, there is no recorded case yet of a student that has been placed at a company based on the result of the matchmaking tool. It is therefore not possible to be sure if the tool is effective in determining the right match between student and company. Still, BedrijvenWijzer expects the matchmaking tool to be suboptimal since certain components of the current tool were mostly designed based on logical reasoning and common sense rather than scientific research or literature. Since an action problem is defined as a discrepancy between how a situation is and how the

problem owner wants it to be (Heerkens & Winden, 2021). The action problem in this situation is that the matchmaking tool of BedrijvenWijzer is not based on scientific findings where they would like it to be.

1.2.3 Constructing a problem cluster

In order to construct a problem cluster and in order to tackle that will result in the improvement of the matchmaking tool, there first needs to be an understanding of how the tool was designed. The design of the tool was inspired by the Dutch StemWijzer, which is a tool that uses a web-based questionnaire in order to provide voters with an understanding of which political party is the best match for them based on their opinion on certain political issues and their relative importance. Like the StemWijzer uses the user's opinion of important issues to match them with political parties that are not always on the user's radar, BedrijvenWijzer aims to match students, based on some important aspects, with companies that are not always on the student's radar.

Two main aspects were selected which were deemed important in a match: corporate culture and personality. These main aspects were in turn subdivided into ten indicators each, which should define both one's personality and corporate culture or corporate culture preferences. In order to measure the positions of both the company and the student on these indicators, two data gathering methods were introduced initially for the pilot phase. On the company side, data was gathered through a workshop where company employees could collectively determine their orientation based on their corporate culture, fitting personalities but also on what positions they had available, what students they were interested in, what industries they were active in, what languages students coming to their company should be able to speak and how they saw the relative importance of a fit in terms of corporate culture, personality or other aspects such as the industries they work in. Next to that, they could select a top three indicators that they found most important for each aspect that would weigh heavier in the computation of matches. The numerical relative weight of these most important indicators relative to the others was intuitively determined without the involvement of the companies. The questions in the workshop were formulated in a transparent way so that the company could have a clear understanding of which aspect and indicator would be addressed at each point.

From the student perspective on the other hand, questions were asked in a way in which it wasn't always clear what indicators were measured with each question. That made the questions more intuitive to fill in for the students, but it also made it so that it had to be determined during development of the algorithm to what extend each question was said something about each indicator. This was done using intuitive reasoning but is however, largely subjective.

Following the analysis of the feedback data that was available through a questionnaire filled in by 7 of the 15 participating companies in the pilot, and the analysis of the questionnaires, workshop and matchmaking algorithm used during the pilot phase, the problem cluster in *Figure 1* can be constructed.

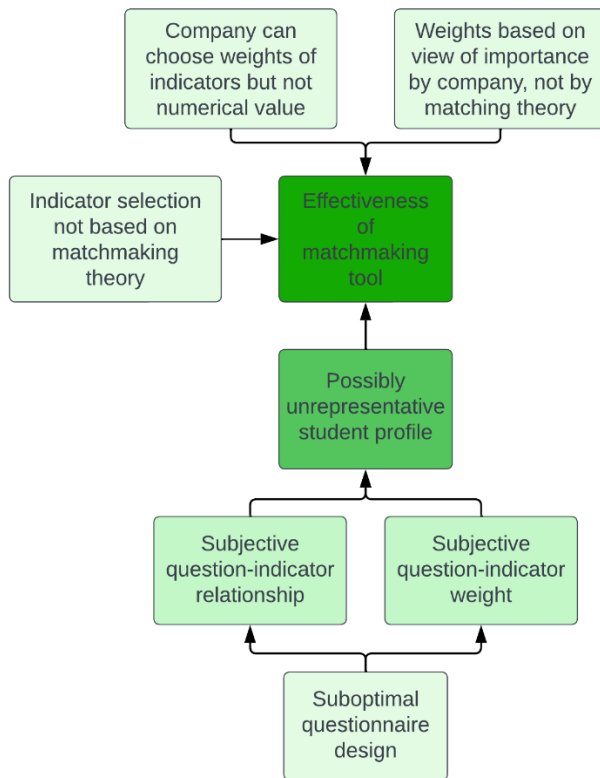


Figure 1: Problem Cluster

1.2.4 Selecting a core problem

Looking at the problem cluster, it can be argued that the possible core problems of the indicators not being selected based on theory and the one going into the questionnaire design on the student side can be easily solved simultaneously when taking a systematic approach to designing a new measure. The reasoning behind this would be that the selection of variables or indicators, that the measurement instrument should aim to measure, would be one of the logical steps in the design of every measurement instrument. The goal of this thesis will therefore be to select a theory supported set of indicators and to methodologically design measures for these indicators on both the students and the company side. This should be done in a way that refrains from the use of predefined and ambiguous weights and allows for an implementation that is intriguing for students, not time consuming and allows for participating companies to be more visible to students.

2. Problem Solving Approach

In this attempt to address the problems mentioned in Section 1.2.4, the first five steps of the *Managerial Problem Solving Method* or *MPSM* by Heerkens & van Winden (2021) will be followed. The reason for using the MPSM is that it is easy to use and easily applicable and tailorable to multiple situations (Heerkens & van Winden, 2021). The MPSM involves the following steps:

1. Defining the problem
2. Formulating the approach
3. Analyzing the problem
4. Formulating (alternative) solutions
5. Choosing a solution
6. Implementing the solution
7. Evaluating the solution

Following these steps, the first chapter of this report was dedicated to the identification and reasoning behind the action problem and the potential core problems that are related to this action problem. In the current chapter a brief description will be given of the current plan of approach to addressing these issues.

For the analysis of the problem, it is opted to do so from the perspective of existing theory about the compatibility between individuals and their work environment, rather than doing so on the basis of available data. The reasoning behind this is that there is not a lot of data available that can be used to reason why used indicators and the way they are incorporated would be lacking. Therefore, in order to be able to properly analyze the problem, a theoretical basis must be established first. The laying of a theoretical basis will start with the conceptualization of what defines a good match. This will be analyzed from the perspective of both students and companies. After that, a literature review will follow exploring that what determines the compatibility between individuals and a work environment. Chapter 3 is dedicated to this. When this theoretical basis is obtained, the theoretical shortcomings of the current tool will be fully analysed in Chapter 4, completing the third step of the MPSM (Heerkens & van Winden, 2021).

From the literature review, it will become evident that some gaps exist in the current body of knowledge that need to be addressed in order to solve the action problem of this research. Some of these gaps arise due to the lack of a comprehensive theoretical framework that incorporates the most important indicators of fit between an individual and the different aspects of their work environment. Others arise due to the lack of literature that is dedicated to the specific context of this study. These shortcomings in theory will be further explored and explained in Chapter 5. This chapter will also provide how the thesis will aim to address them through research. This research will serve as a starting point for the consideration of a set of alternative existing matchmaking tools and indicator implementations. The benefits and pitfalls of these alternatives will be analyzed and discussed according to a number of criteria that are in line with the goals and requirements of the *BedrijvenWijzer*. This will conclude the fourth step of the MPSM (Heerkens & van Winden, 2021).

Finally, the analyses of alternative tools will form the basis for the reasoning behind the selection and recommendation of the most promising alternative solutions to *BedrijvenWijzer*. Along with the recommendation of an alternative solution, an implementation strategy will be proposed. In the proposition, the limitations of this research, as well as the recommendations for further research will be presented. This is done so that *BedrijvenWijzer* will be aware of all the risks and difficulties that could come with the implementation of the proposed solution. This will conclude the fifth step of the MPSM (Heerkens & van Winden, 2021).

Due to time limitations, the final two steps of the MPSM (Heerkens & van Winden, 2021) will not be included in this thesis. However, as mentioned in the previous paragraph, an implementation strategy will be suggested in order to provide *BedrijvenWijzer* with the means to take these final steps and further develop their tool.

3. Conceptualization of Important Constructs and Variables

In order to be able to say something useful about the effectiveness of matchmaking and the quality of matches, there first needs to be a proper understanding of what a good match defines and how good matchmaking can influence and predict desirable outcomes like job satisfaction and productivity. When such an understanding is obtained, an analysis of the current situation can be performed. This chapter will go about laying a basis for the understanding of the problem by answering two questions; (i) *‘What would having a “good match” mean to both students and companies in the context of the BedrijvenWijzer?’* and (ii) *‘What indicators determine the compatibility between an individual and their work environment and what are the consequences of such a compatibility?’*. Section 3.1 will concern itself with the first question. Then, in section 3.2, the second question will be addressed through the review of literature.

3.1 The conceptualization of a ‘good match’

In order to define what it means to have a good match between a person and a company, the goal of the matchmaking should be considered. The goal of the matchmaking however, depends on perspective. A student will naturally have a different view on what a good match would look like compared to the view of a company.

3.1.1 Company perspective

From a company perspective, there are some requirements as to what is necessary in order for a student to be considered as a match. Examples would be the positions that are open, the languages the student should be able to speak and the prerequisite knowledge necessary to fill in the position. The goal of the inclusion of these requirements can be specified as making sure the candidate is capable to fill in the open positions. After that the goal for matchmaking for the company could be to find someone that fits well into the company and the team, is productive, performs well and is motivated to do the required work.

Next to that, since data from the pilot indicates that most students (52%) opted not to allow matched companies to contact them, companies would want matches with students that are likely to contact them. In this way they have a specific interest in how well they spark initial interest with students. It should therefore not only be considered what outcomes matches would theoretically provide in terms of job satisfaction, performance, wellbeing, and productivity, but also what factors students look for initially when looking for a first place to work or do an assignment or internship.

3.1.2 Student perspective

Research indicates that students initially base career decisions on a number of internal and external factors. Internal factors that are considered are mainly an opportunity’s match with the student’s personal interest, skills and abilities and study area, as well as the possible standards of living, growth and traveling opportunities, and the attractiveness of the work environment (Purohit, Jayswal & Muduli, 2020).

External factors that students often consider in making career decisions are employee benefits, such as salary, but also market related factors such as job availability and location related factors (Purohit, Jayswal & Muduli, 2020). Since the matchmaking tool, as it is now, is focused exclusively on the region of Twente, companies are located relatively close to each other. It can therefore be assumed that location and the corresponding travel distance are not such important factors to consider in the tool. However, since students and starters in most cases don’t have a car, and since they are therefore largely dependent on the reachability of the location by bike, public transport or other means of transport potentially provided by the company such as a lease car, it might still be relevant to take some measure of commutability into account.

Furthermore, factors such as salary or job availability should also not be the focus of the matchmaking. The goal of the tool should not be to assess and recommend the competitive position of each opportunity in their respective field on the job market but rather to find students a match with a company where their interests, values, goals/ambitions and personality and skills would allow them to flourish.

In a match with a company, students are likely to be satisfied with a match that they feel qualified for in terms of their study background and skills, that sparks their interest in terms of vocation type and job characteristics, and that are perceived to contain a desired atmosphere in terms of colleagues, values and growth opportunities.

3.1.3 Conclusion

Overall, there should be number of criteria that should be met in order for a company and student to be considered as a match. These criteria would be that the desired skills and study backgrounds of the student are met and that the desired employment type of the student, such as a job, side-job, internship, bachelor or master graduation assignment, are met by the availability of that employment type at the company. If those criteria are matched the objective is to find a match based on indicators that would predict the extent to which the student will be interested in, and open to contact with the company and that predict how well the student would fit into the work environment that the company can provide, such that an eventual job, internship or assignment at the company would be likely to result desirable outcomes such as high job satisfaction, performance, commitment, personal well-being and retention.

3.2 Conceptualizations of fit

This section is dedicated to answering the question: What indicators determine the compatibility between an individual and its work environment? Next to that, this section will look into the relevance of this compatibility.

Over the years a lot of research has been done in the field of management psychology surrounding the interaction, compatibility and attraction between individuals and their work environment (e.g. Holland, 1973; Schneider, 1983; Schneider, 1987). Over time, related theories such as the Attraction, Selection and Attraction (ASA) theory by Schneider (1987) and Holland's theory of vocational choice (1973) have been incorporated in the study of compatibility between individuals and (facets of) their work environment. When describing the compatibility of an individual and its work environment, the term fit or more specifically Person-Environment fit or P-E fit is often used (Kristof-Brown et al., 2005). Though this term is subjective to many conceptualizations, some of its aspects are widely accepted. Person-Environment fit as a global construct consists of Person-Organization fit, Person-Group fit, Person-Vocation fit and Person-Job fit (e.g. Kristof, 1996; Ehrhart & Makransky, 2007; Herdman & Carlson, 2009). These aspects of Person-Environment fit each assess the compatibility of the individual with a specific level of the work environment. The conceptualizations of these aspects, their opalizations and their relevance will be discussed in further detail in Section 3.2.2.

Next to the aspects of fit that go into the different levels of which a work environment consists, a distinction in fit can be made between complementary and supplementary fit (Kristof, 1996). These concepts go into the nature of what defines good fit. Supplementary fit measures the extent to which the individual's characteristics are similar to that of its environment. Complementary fit on the other hand, is achieved when a gap in the current work environment is filled by the individual or if the work environment fills in a gap in the needs of the individual. In the former case there is often a demand in the environment for an individual with a certain set of skills or with certain knowledge which the individual should possess. The extent to which this demand is met is called the demands-abilities fit (Kristof, 1996). The extent to which the needs of the individual are met by the environment is called the needs-supplies fit (Kristof, 1996).

3.2.1 The measurement of fit constructs

In fit research, a distinction should be made in terms of how fit is measured as it has a significant impact on the nature of any identified relationship. Fit is often measured either directly or subjectively, asking participants to which extent they perceive they fit with a certain aspect of their work environment, or indirectly or objectively, measuring similarity or complementarity on goals, values, characteristics or knowledge, skills and abilities (KSAs) (e.g. Kristof-Brown et al., 2005; Kristof, 1996; Piasentin, & Chapman, 2007). Though subjective and objective fit are highly correlated, they are not equivalent. Many researchers argue that subjective fit is more important as it represents the fit with respect to a certain aspect of the work environment as perceived by the individual and is therefore assumed to be a better predictor for pre-hire and post hire outcomes. (e.g. Ehrhart, 2006; Garavan, 2007; Ehrhart & Makransky, 2007). Following this premise, it can be interesting to measure subjective fit in the tool rather than objective fit. Whether or not this is viable will be assessed in a later stage when looking at alternatives to the currently used methods.

Though most researchers who occupy themselves with research on antecedents and consequences of fit, measure the construct of fit with respect to a specific aspect of the work environment (e.g. Ehrhart & Makransky, 2007; Seong et al., 2012; Iyer et al., 2019), some argue that the boundaries between fit with respect to individual levels of the work environment are often ambiguous and overlap, making it hard to reach definitive conclusions about their relationships with possible antecedents and consequences (Herdman & Carlson, 2009). It can therefore be argued that, when trying to measure fit, it should be done with a global measure such as a measure for P-E fit in its entirety. This research will however not adopt this statement since it is relatively unsupported in literature. Moreover, there is enough empirical evidence for the conceptual differences between fit with respect to different levels of a work environment (Kristof-Brown et al., 2002).

3.2.2 Different fit perspectives

As mentioned in the first part of Section 3.2, the level of compatibility between an individual and a work environment is determined by the level of compatibility between an individual and the different facets of said work environment such as the organization, work group, vocation and job. In this section, these types of fit, their antecedents and relevance will be discussed in further detail.

Person-organization fit

Person-organization fit, or P-O fit, is widely used to describe the compatibility between an individual and the organization they work for (Kristof, 1996). Still, there exists confusion and debate as to what the exact conceptualization of person-organization fit is since, as mentioned earlier, compatibility can be reviewed in multiple ways.

Supplementary P-O fit is often determined by the extent to which the individual and the organization share similar values, goals, and personality traits (Kristof, 1996; Gardner et al., 2012; Iyer, 2019). The latter is often operationalized for the side of the organization as the traits that suit the agreed upon organizational climate or culture. Feelings of supplementary fit also arise from the process of socialization and tenure (Kristof, 1996), indicating that, over time, individuals will adopt values, goals and personal traits from the organization they work in if socialization occurs to a sufficient extent.

Complementarity in literature is mostly focused on demands-abilities and needs-supplies fit, often with respect to the individual's compatibility with respect to the job they are asked to perform, so the person job fit. There does exist a consensus among fit researchers that complementarity increases feelings of fit but

empirical evidence shows it to be a significantly weaker predictor of perceived P-O fit (Piasentin & Chapman, 2007). Kristof (1996) proposed a model combining both supplementary and complementary fit which can be seen in figure 2. Though this model provides a good overview of how complementary and supplementary fit exist between individuals and organizations, it can be argued that most aspects of the model on the complementary fit side are more or equally predictive and relevant for person-job fit. This is especially true for the match between demands-abilities fit. This illustrates the ambiguity of borders between fit with respect to different aspects of the work environment as illustrated by Herdman & Carlson (2009).

P-O fit is probably one of the most important fit perspectives for this research since it entails the global compatibility of an individual at an organization and is a well-established predictor of a number of beneficial outcomes from both an employee as well as an employer perspective. These outcomes include increased job satisfaction, performance, retention and organizational commitment (e.g. Kristof-Brown, Zimmerman, & Johnson, 2005).

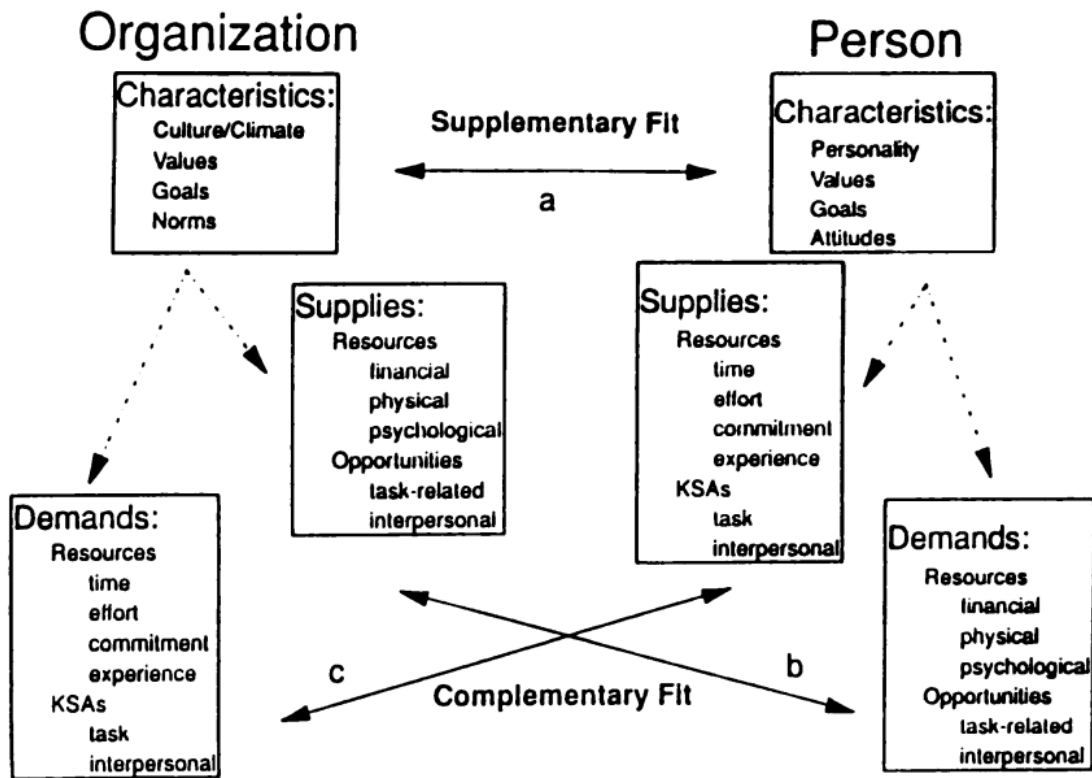


Figure 2: Model of how people and organizations interact to result in a level of fit (Kristof, 1996)

Person-group fit

Person-group fit describes the compatibility between individuals and their work group and is closely related to theory on team composition (Kristoff, 1996). Like most types of fit, person-group fit is operationalized both in supplementary and complementary fit.

Supplementary person-group fit measures the extent to which the individual shares values, goals and personality traits with others in the work group (Kristof, 1996). There also exists some empirical evidence that congruence in certain demographic characteristics such as gender and work experience positively influence perceived supplementary person-group fit (Seong et al., 2012). Still, research has shown that, with time, emphasis on demographics decreases and more attention will be paid to the underlying compatibility among team members (Harrison et al., 2002).

Complementary person-group fit often occurs through heterogeneity in terms of KSAs (Kristof, 1996). This is supported by empirical evidence which shows that within-team educational diversity is significantly positively related to perceived complementary person-group fit perceptions (Seong et al., 2012).

When person-group fit has a number of consequences that make it relevant to take this fit perspective into account when assessing options for measures to include in the matchmaking tool. It has been shown that person-group fit is moderately positively related to overall job satisfaction, organizational commitment and overall performance, as well as contextual performance (Kristof-Brown, Zimmerman, & Johnson, 2005). The latter refers to the performance on tasks that are not directly related to the job, but have a significant impact on social, psychological and organizational contexts (Díaz-Vilela et al., 2015). Furthermore, P-G fit is shown to be strongly positively related to group cohesion and moderately negatively related to intention to quit (Kristof-Brown, Zimmerman, & Johnson, 2005).

Person-vocation fit

The fit perspective assessing the extent to which an individual fits with their occupation is called person-vocation fit (Kristof-Brown, Zimmerman, & Johnson, 2005). Contrary to most fit perspectives, person vocation fit is mostly concerned with the complementary perspective of to what extent needs and interests of the individual are being met by the occupational environment and its characteristics (Kristof-Brown, Zimmerman, & Johnson, 2005; Piasentin, & Chapman, 2007).

Though little research has been done showing the consequences of person-vocation fit, Holland's (1973) congruence theory reasons that it should be positively related to vocational satisfaction, performance and career stability. Some empirical evidence exists for this theory in that the congruence between vocational interest and perceived skill requirements is positively related to vocational satisfaction (Feij et al., 1999). It is also theorized by Holland (1973) and empirically confirmed by Feij et al. (1999) that this congruence increases over time. Contradicting evidence of sorts also exists, concluding that there is no significant relation between interest congruence and satisfaction (Tranberg et al., 1993). A possible explanation for these contradicting results can possibly be explained by the differences in operationalizability of person-vocation fit and satisfaction. The latter because satisfaction is a construct that is affected by many factors including the vocation and the organization which, as argued by Kristof (1996) can have distinctly different characteristics.

Person-job fit

Where person-vocation fit describes the fit of an individual with a certain general occupation, person-job fit describes the extent to which an individual fits with a specific job description, the underlying tasks that come with it, and the specific job characteristics (Kristof, 1996; Ehrhart, 2006b). According to Edwards (1991) person-job fit represents either the demands-abilities fit between the KSAs of the individual and the demands of a job, or the needs-supplies fit between the needs and desires of the individual with the characteristics and perks of the job.

Person-job fit is found to be significantly positively related to job satisfaction, organizational commitment, organizational attraction and intent to hire (Kristof-Brown, Zimmerman, & Johnson, 2005). Furthermore,

P-J fit is found to be moderately positively related to the extent to which the individual experiences a sense of belonging to the organization and overall performance (Karanika-Murray et al., 2015; Kristof-Brown, Zimmerman, & Johnson, 2005). P-J fit has been found to be negatively related to intent to quit and indicators of strain (Kristof-Brown, Zimmerman, & Johnson, 2005).

3.2.3 Conclusion

Recall from the introduction of Chapter 3, the questions that the literature review was meant to answer were; (i) *‘What would having a “good match” mean to both students and companies in the context of the BedrijvenWijzer?’* and (ii) *‘What indicators determine the compatibility between an individual and their work environment and what are the consequences of such a compatibility?’*.

We have established how a ‘good match’ from the point of view of both the student and the company would be that they match on what they want and have to offer in terms of background and job type. Furthermore, a match that predicts a high level of job satisfaction, personal wellbeing, job performance, job retention and organizational commitment would be considered to be good. Hence, we have succeeded in answering the first question.

We have also established how the compatibility between an individual and their work environment is captured in the terminology of person-environment fit, and having established what this person-environment fit consists of, what its antecedents and consequences are, and how fit can be operationalized differently. The second question was answered. Therefore, the purpose of the literature review has been fulfilled.

4. Analysis of the current situation

In this chapter, the current tool will be analyzed according to the knowledge gained in the last chapter 3. Its strengths and shortcomings will be discussed and highlighted per aspect with the intention of identifying what is yet unknown, and what consequently still has to be researched in order to propose any improvements to BedrijvenWijzer

4.1 Matchmaking conditions

In the current matchmaking algorithm, there are a number of conditions in place on which student and company need to match in order to even be able to be considered as a match. These conditions are relatively self-explanatory in the sense that if an individual does not have the required study background, is not interested in a specific field, or is looking for a different type of employment, it does not add a lot of value for either party to learn if they would be compatible based on other indicators.

4.2 Matchmaking indicators

Looking at the currently used indicators used in the matchmaking algorithm, a comparison can be made between what should be good indicators to consider according to literature and what is implemented in the current version of the BedrijvenWijzer.

Though initially it looks as though one widely supported aspect of P-O fit, personality congruence, is implemented into the algorithm, this is not necessarily the case. Matchmaking does happen based on a set of indicators representing the constructs of personality and company culture. However, matchmaking doesn't happen through the measurement of the extent to which the personality characteristics of students are similar to the company culture characteristics as research suggests. Rather, matchmaking happens through more of a demands-abilities or needs-supplies fit perspective, measuring the extent to which personality characteristics of students match what companies are looking for in terms of personalities and the extent to which students' preference for certain company culture characteristics match the company culture characteristics as reported by the company.

This is not necessarily a bad perspective to take, as the congruence between work climate desires and actual work climate is likely to result in high P-O fit perceptions. It can also be expected that companies might prefer personality characteristics that are similar to employees they have good experiences with. This, in turn, might also result in supplementary P-O fit. In order to have this effect however, students and companies do need to have a strong idea or distinct preference for what they are looking for in terms of company culture characteristics and personalities respectively. Especially for students, this might not be the case initially as they tend to not have the experience with different company cultures to judge where they would fit best. It can therefore be argued that in this situation, for students as a target group, it might be better to take the objective supplementary P-O fit perspective of personality congruence between student and company as a measure of fit in the matchmaking algorithm.

Another point of attention would be that, from a global person-environment fit perspective, the current set of used indicators and conditions only cover a very small portion of what determines the compatibility between an individual and their work environment.

4.3 The operationalization of the indicators

As mentioned in the problem identification section of this document, there exists a problem on the student side of the matchmaking algorithm in how the questions in the questionnaire eventually result in indicator scores. Though, due to confidentiality restrictions, specifics can not be discussed, the way in which indicator scores are obtained is susceptible to subjective weights and relationships. The validity, which concerns whether something measures what it aims to measure (Heerkens & van Winden, 2021), can therefore be called into question.

5. Research design

In this chapter, it will be discussed how this thesis aims to address the shortcomings of the current body of knowledge through research. It will argue why this research is necessary, what research is necessary, what the deliverables of this research will be, what the research perspective will be, how research will be performed and what implications and limitations these methods will imply.

5.1 Introduction

Now that there is some clarity as to what a good match between an individual and a work environment and its aspects would look like in general, it can be explored what it will look like in the context of a digital matchmaking tool between students and regional companies. Since as far as it is known no existing literature covers fit in this specific context, there is need for additional research that tries to do this. This research and its research questions will flow from the knowledge problem; *How can the most relevant indicators of fit between students and regional companies be measured efficiently and effectively and applied in a digital matchmaking tool?*

In order to find an answer to this knowledge problem, an assessment first is made to see what gaps in the current literature exist that need to be filled in order to come up with an answer. Such a gap exists in that there is no comprehensive framework yet that reflects how individuals interact with their work environment to represent a level of fit. Having such a framework would help to overcome the problem of disagreement and misconceptions in the conceptualizations of fit perspectives. So, it is reasoned that before applying gained knowledge to the context of this study, such a visual overview should be constructed first. When this is done, there will be a sufficiently extensive theoretical background to start addressing the issue of how this knowledge can be incorporated into the context of a digital matchmaking tool aiming to match students with regional companies. Alternative, indicators, measures and measurement forms can subsequently be suggested and analyzed.

In order to come up with alternative measures, first a set of indicators must be obtained that are specifically relevant for this study. These indicators will then be incorporated into a contextualized model representing their relevance and their importance in the context of this study. Consequently, a literature study will be performed to assess how, in the context of this research, these important indicators can be measured. Lastly, different methods of data gathering in the context of a digital matchmaking tool should be explored. Overall, the knowledge problem can be divided into four sub questions that should be answered in order to find an answer. These sub questions are:

1. How can indicators of P-E fit be adopted into a comprehensive framework of P-E fit?
2. What indicators of fit are relevant for the context of this research?
3. How can these indicators be measured for students and companies?
4. How can a digital matchmaking tool be constructed in such a way that it measures the indicators and provides meaningful matches while still being quick, intriguing, easy to use and able to provide the participating companies with more visibility among students?

To illustrate how this this thesis will go about answering these questions, the flow chart in Figure 3 was constructed. Here, it is shown globally how each chapter will not only fulfill their corresponding intention of answering one or two of the questions posed above, but also how they serve as a starting point for the next chapter.

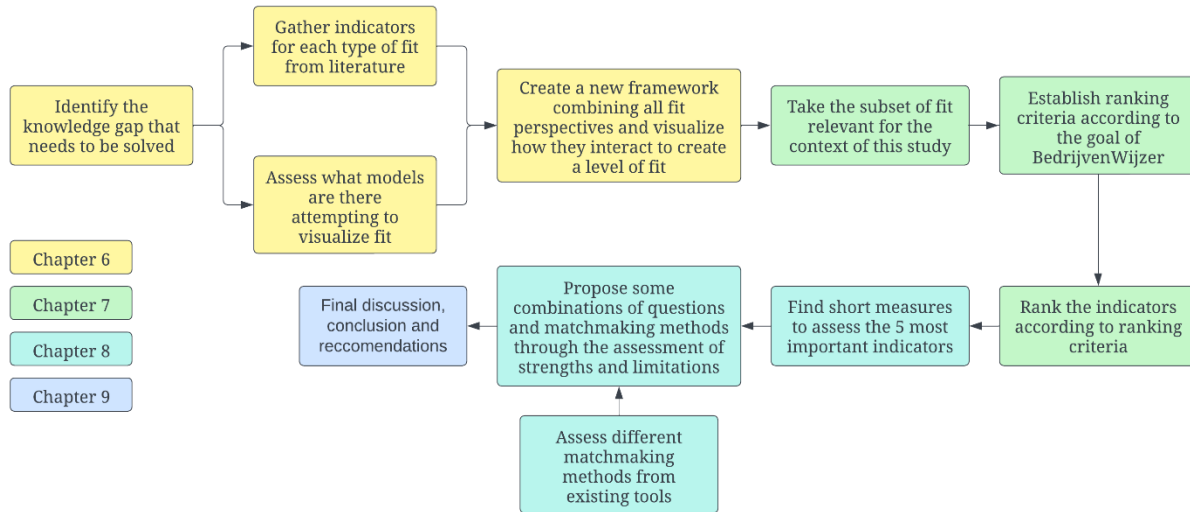


Figure 3: A chapter-by-chapter flowchart of the research process.

5.2 Deliverables

In answering the questions mentioned above, this study aims to produce the following deliverables to BedrijvenWijzer:

1. A comprehensive framework that represents how individuals interact with their work environment through these indicators.
2. A comprehensive overview of the relevant indicators in the context of this study with an indication of relative importance.
3. A set of alternative ways of measuring these indicators in a digital tool, provided with some examples and an analysis to discussing the perks and drawbacks of each implementation.
4. A recommendation including argumentation of one implementation with the most potential in this context.

5.3 Research perspective

In order to give this research boundaries, structure and purpose, it needs to be considered what the perspective of research will be. Since the research perspective refers to “the viewpoint from which the researcher observes phenomena in any specific research context” (Clarke & Davison, 2020), and since the problems that are attempted to be solved mostly impact the users of the BedrijvenWijzer, which are arguably also the most important stakeholders, it is reasoned that this research will be best off taking a user’s perspective. This implies that this research will consider, evaluate and propose to implement possible solutions based on the interests of, and effects on students and companies participating in the BedrijvenWijzer. Other perspectives, such as the revenue model behind the BedrijvenWijzer or the manner of the implementation of changes will therefore not be considered.

5.4 Data analysis methods

In order to analyze the data gathered from literature, findings from each literature study will be consolidated into an overview. This is especially important for the studies that are aimed to find important indicators and operationalizations for these indicators since, in order to eventually make a choice for which indicators will be included in the tool and how they will be operationalized, a proper understanding must be obtained of all the pros, cons and limitations. Since most of this data will probably be non-numerical, decisions will be made through reasoning rather than through statistical analysis.

6. A comprehensive framework of Person-Environment fit

As mentioned in the last chapter, there is need of a framework that represents how individuals interact with all levels of their work environments resulting in a certain level of Person-Environment fit (P-E fit). Hence, this chapter aims to answer the question: *How can indicators of P-E fit be adopted into a comprehensive framework of P-E fit?* Consequently, this chapter aims to present such a framework with the intention of preventing any further issues due to differences in conceptualizations and kinds of measurements in fit literature. First, existing models from literature will be analyzed to get a better idea of what is lacking in literature and what can be used. Then, in Section 6.2, the used method for constructing the framework will be introduced and followed in the following sections. The purpose of Section 6.3 will be to clarify what indicators and perspectives should be included in a comprehensive framework of fit and to see how these should be structured. In Section 6.4, the new framework will be introduced and its use will be explained. Finally, in Section 6.5, a conclusion will be drawn from the new framework. Its further use and implications for the remainder of this thesis will be discussed.

6.1 Existing frameworks of fit

In the literature review conducted in Chapter 3, two distinct models were encountered that could serve as an inspiration as to how a comprehensive framework for P-E fit would look: (i) the hierarchical P-E fit model (see Section 6.1.1), and (ii) a comprehensive P-O fit model (see Section 6.1.2).

6.1.1 Hierarchical Person-Environment fit model

One of these models is that of Herdman and Carlson (2009) as shown in Figure 4. This model represents three different levels of the fit space and how each level collectively affects the same dependent variables as they all represent the collection of aspects that collectively determine the compatibility between an individual and their work environment.

First, in the lower level, there is a collection of distinct attributes that represent how well a specific characteristic of the work environment and the individual fit together. An example for such characteristics would be the compatibility between the culture of the company and the personality of the individual, or the average age in the marketing department of an organization and the age of an individual. In the mid-level, there are the different perspectives of fit that, according to Herdman & Carlson (2009), are all relevant perspectives of fit that collectively represent the compatibility between the individual and the entire work environment, and that consist of the attributes seen in the lower level. Some of these attributes fall in two or all of the perspectives, hence the overlapping of the ovals representing each fit perspective. Lastly, at the highest level, there is the perception of P-E fit. Or, in other words, a measure of the extent to which one believes they are compatible with their work environment. The high-level perspective of P-E fit consists of all the perspectives and attributes of the lower level and mid-level.

Recall from Chapter 3 that P-E fit, which is defined as the level of compatibility between the entirety of the work environment and an individual, consists of *Person-Organization fit* (P-O fit), *Person-Group fit* (P-G fit), *Person-Vocation fit* (P-V fit) and *Person-Job fit* (P-J fit). Although this model does represent some aspects of the conceptualization of P-E fit (i.e. P-O, P-G and P-J fit) and its measurement, it is neither complete, intuitive nor extensive enough to serve as a comprehensive framework for P-E fit. First of all, it disregards person-vocation fit. Next to that, it makes no distinction between different types of fit nor between different measurement types. And lastly, while it does illustrate how the fit perspectives consists of the fit between attributes of individuals and work environments, it does not specify which ones, and therefore does not contain any specific indicators of P-E fit. Still, this model could serve as a good source of inspiration for the construction of the framework that this thesis aims to present as it does illustrate how

the fit between certain specific attributes can be a part of multiple perspectives. Furthermore, this model shows one way of visually representing the different levels of fit.

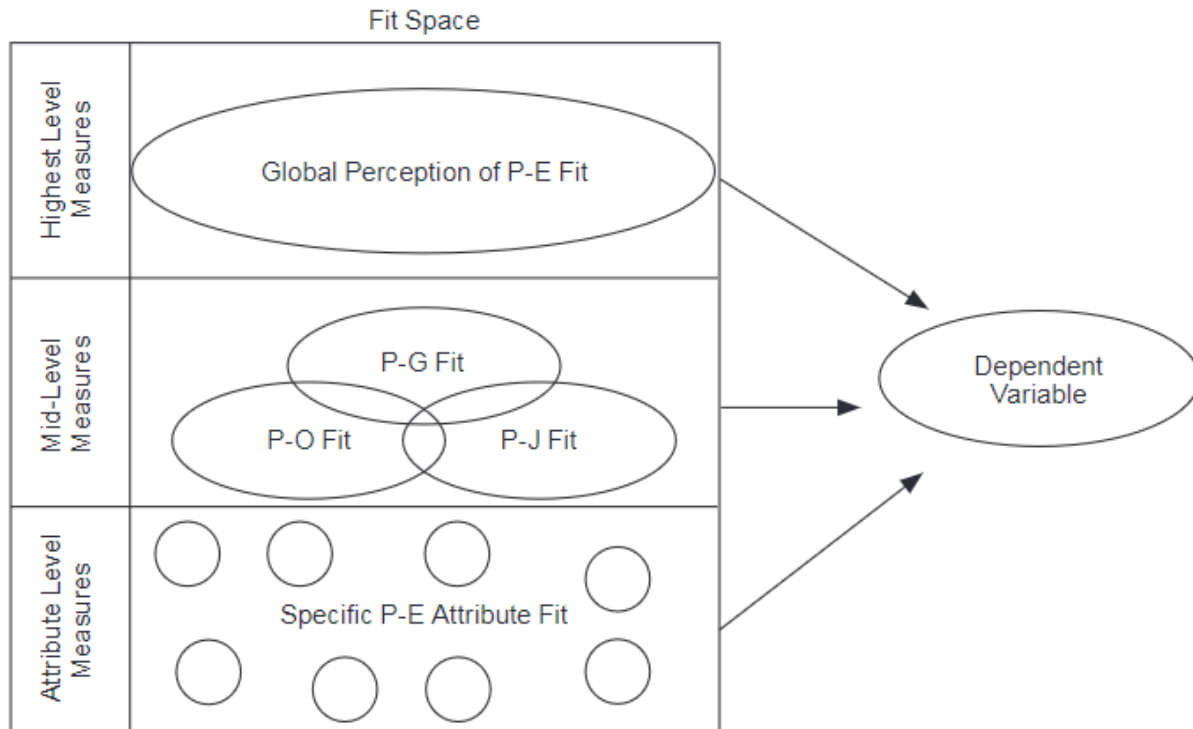


Figure 4: Hierarchical framing of person-environment fit measures (Herdman & Carlson, 2009).

6.1.2 A comprehensive Person-Organization fit model

Another attempt to visualize fit is the model presented by Kristof (1996) shown in Figure 2 in Chapter 3. Recall from Section 3.2.2 that Person-Organization fit (or P-O fit) represents the level of compatibility between an individual and the organization. Kristof's (1996) model represents how the characteristics, demands and supplies of an individual interact with the characteristics, needs and demands of an organization to form either a level of supplementary and complementary P-O fit.

In this model, the needs or demands, supplies and characteristics of the individual is given on the right while the demands, supplies and characteristics of the organization is given on the left. The arrows indicated by the letter a, connecting the characteristics of both the individual and organization, represents the complementary fit between these characteristics, since the level of P-O fit is perceived to be higher as characteristics of the organization show similarity to those of the individual (Piasentin & Chapman, 2007). The arrow indicated with the letter b, connecting the supplies of the organization and the demands or needs of the individual, represents the complementary fit. The reason for this is that the level of P-O fit is perceived to be higher as the needs for certain resources and opportunities of the individual are met by the organization (Kristof-Brown et al., 2005). Similarly, the arrow indicated with the letter c, connecting the demands of the organization to the supplies of the individual represents complementary fit. This can be explained since the level of perceived fit is higher as the demands of the organization for someone with certain resources such as time and experience and someone with certain knowledge skills and abilities or KSAs is met by the KSAs and other supplies of the individual (Kristof-Brown et al., 2005).

Though this model only represents P-O fit and therefore disregards the rest of the aspects of a work environment such as the fit with the job, vocation or work group (as discussed in Section 3.2.2). Therefore, the model is not extensive enough to represent the interaction between individuals and their work environment (i.e. P-E fit). Still, the model does deconstruct and categorize the different indicators of P-O fit to visualize how they interact to create either supplementary or complementary fit.

As mentioned before the introduction of this chapter, one of the aims of our P-E framework should be to visually represent how the individuals and different levels of their work environment interact to form indicators for different fit perspectives, with the intent to counteract confusion in conceptualization and measurement of fit. Since Kristof's (1996) model visually represents how individuals interact with one specific level of their work environment, namely the organization, the model could serve as a good inspiration and starting point for the framework this thesis aims to present.

6.2 Method to constructing a framework of Person-Environment fit

Because Kristof's (1996) framework manages to capture how different attributes, such as the characteristics, demands and supplies, of both the organization and the individual interact to form either a level of supplementary fit or complementary P-O fit. Recall that from the literature review in Chapter 3 that we found that such a framework that is missing in the current literature for all the fit perspectives and that such a framework would be useful to prevent issues due to differences in (understandings of) conceptualizations. Therefore, we will take the general outline of Kristof's (1996) model as an inspiration for our new model. This is done through making a distinction between two sides: (i) the side of the work environment or the organization in Kristof's (1996) model, and (ii) the side of the individual or the person. Next to that, similarly to Kristof's (1996) model, a distinction will be made between different attributes of the individual and the work environment such as a distinction between characteristics, demands and supplies. Lastly, and similarly to Kristof's (1996) model, our model will also connect attributes of both the work environment and the individual to represent how they interact to form some level of supplementary or contrary fit.

Contrary to Kristof's model however, our framework would not only represent Person-Organization fit. Instead, it would include the fit of the individual with respect to all levels of the work environment into a single framework in a visually attractive manner. In doing so, we will adopt the hierarchal framing of person-environment fit as seen in the model by Herdman and Carlson (2009) as presented in Figure 4. From this model we take the multilevel perspective of fit where the compatibility of the individual with a work environment or Person-Environment fit, consists of the fit with different dimensions of said work environment. These fit dimensions are the fit with the organization (P-O fit), the work group (P-G fit), the vocation (P-V fit) and the job itself (P-J fit). Similarly, to the same model, we take that these dimensions each consist of the level of similarity or complementarity between different attributes. As proposed in the model of Herdman and Carlson (2009), these attributes can belong to one or more fit dimensions.

So, in order to construct the framework, we will start by making two columns. One to represent the work environment and its attributes, and one to represent the person or the individual and their attributes.

Then, we will divide the columns into 4 rows, representing each of the underlying dimensions of the work environment: the organization, the work group, the vocation and the job.

When these distinctions have been made, a set of indicators will be selected from literature. The selection happens based on the strength of their relationship to fit, ethical considerations and importance for either party (e.g. *work environment* and *person*). The inclusion and exclusion of certain indicators will be discussed.

To get an overview of for which of the four mid-level fit perspectives the indicators are actually predictors, they will be grouped. This will be done in such a way that it is possible for an indicator to be a part of multiple fit perspectives (Herdman & Carlson, 2009).

From that, the indicators are deconstructed in what they would represent for both spectrums of the person-environment relationship: (i) the person and (ii) the environment. Similarly to Kristof’s (1996) model in Figure 2, these are then to be categorized in one of the attributes; *needs, demands, supplies, abilities and resources, and characteristics*. For example, as illustrated in Figure 5, the indicator *personality congruence* can be deconstructed in the characteristic *personality* on the *person* spectrum and the characteristic of *company culture* in the spectrum of the *work environment*. These attributes are then placed in the right row and column in the framework. To maintain an overview of the attribute types per fit perspective, each attribute type is grouped. In the *Group* perspective for instance, the characteristics of the group are grouped together in the *work environment* column, and the characteristics of the individual that interact with the group characteristics are grouped together in the *person* column.

Then, in each row, each attribute type is connected to another attribute type from the other column to represent how they interact, through similarity or complementarity, to form a level of fit. In this, the characteristics in each row on the *work environment* column will be connected through similarity to the characteristics in the *person* column to form *supplementary fit* (see Figure 5). Conversely, the supplies in the *work environment* column will be connected through complementarity to the needs on the *person* side to form complementary fit. Similarly, the demands on the side of the *work environment* will be connected to the abilities and resources on the *person* side to form *complementary fit*.

Lastly, an entity will be added to the framework to represent an observer. The observer will be someone or something that judges the level of fit between the *work environment* and the *person*. Recall from Section 3.2.1 that this can be done in two ways; (i) subjectively, measuring the extent to which the observer, which could be the person concerned, to what extent they perceive they fit with a certain aspect of the work environment, or (ii) objectively, measuring fit through the level of similarity or complementarity between the individual attributes of the individual and an aspect of the work environment. To represent the measurement of subjective fit, an arrow from the observer should be drawn to the arrows connecting the attributes of the individual and the work environment. The idea behind this is that the observer makes an assessment of the supplementary or complementary fit that arises through the interaction between these attributes and doesn’t look at the attributes themselves. Conversely, to represent the measurement of objective fit, a pair of arrows should be drawn. One from the observer to the attributes of the work environment and one from the observer to the attributes of the individual. The idea behind this is that measuring objective fit is done by looking at the attributes on both sides and by making an assessment of the level of similarity or complementarity of each of these attributes.

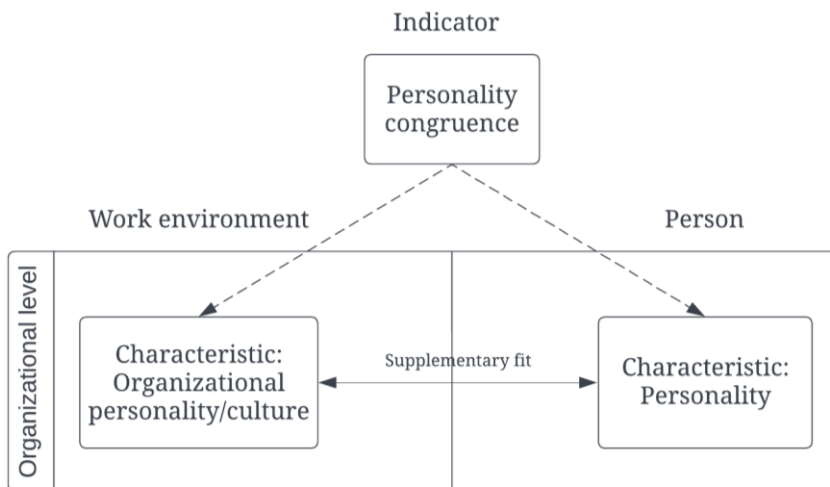


Figure 5 : How indicators are deconstructed to represent the supplementary or complementary interaction between aspects of the individual and the environment.

6.3 Construction process

6.3.1 Identifying indicators to include

As mentioned in Section 6.2, the construction of the framework will require the creation of a list of important indicators that should be included. This list will be constructed through a combination of the indicators that have been identified from the literature during the review in Section 3.2.2, the indicators that can be taken from Kristof's (1996) model, and some complementary fit indicators that seem logical to include based on identified needs of students as assessed in Section 3.1.2.

Recall from Section 3.2.2 that in terms of supplementary fit, indicators arise through the congruence in characteristics of the individual and certain aspects of the work environment. Characteristics that have been known to increase (the feeling of) fit are personality, goals, values, norms and attitudes, and interests and tasks (e.g. Kristof, 1996; Kristof-Brown et al, 2005; Piasentin, & Chapman, 2007; Ehrhart, 2006b). Hence, indicators of supplementary fit are *personality congruence*, *value congruence*, *goal congruence*, *task-interest congruence* and *norms-attitude congruence*. Similarity or congruence in age has also been shown to be a predictor of supplementary person-group fit (Seong et al., 2012). It is opted however not to include this indicator in the framework since the selection on the basis of similarity in gender is neither wishful for an organization's performance (Badal & Harter, 2013), nor is it ethically accepted. Furthermore, the similarity in work experience has been shown to positively influence supplementary fit (Seong et al., 2012), however, this relationship is not very strong, and selection based on experience similarity can be detrimental to the continuity of knowledge and therefore to performance and sustainability of the organization. It has therefore been opted not to include this indicator either.

In terms of complementary fit, there are two kinds of sources that have been explained in Section 3.2; (i) *demands-abilities fit*, which is concerned with the extent to which the individual's abilities and resources meet the demands of the (facet of the) work environment, and *needs-supplies fit*, which is concerned with the extent to which the (facet of the) work environment meets the needs of the individual.

From the literature review in Section 2.3.3 and Kristof's (1996) model in Figure 2, we found that heterogeneity of knowledge, skills and abilities or KSAs a very important part of the *demands-abilities fit* since this encapsulates the set of competences the (facet of the) work environment is looking for. Next to that, a specific job can require a set number of hours a week, commitment in terms of willingness to make extra hours, and experience. This is indicated by Kristof (1996) in her model under resources and is considered to be another kind of *demands-abilities fit*. Hence the demands abilities fit or D-A fit indicators we identified are *KSAs D-A fit*, *experience D-A fit*, *time D-A fit* and *commitment D-A fit*. The indicator of effort D-A fit has not been taken over from Kristof's (1996) model since it is not considered to be substantially different from the indicator for commitment.

In terms of *needs-supplies fit* very little specific indicators are given. This is likely due to the wide variety of different needs an individual can have. Still, we will try to look for the most important needs to consider and put them into the framework. Kristof's (1996) model already included some general ones as *demands* on the side of the *person*. These include financial, physical, psychological, task-related and interpersonal needs. With these as inspiration and taking into account the needs identified in Section 3.1.2 for challenge in the job, standards of living, growth, traveling opportunities, salary and location related factors, we identified the needs-supplies fit or N-S fit indicators; *financial N-S fit*, *commutability N-S fit*, *growth opportunities N-S fit*, *social N-S fit*, *travel opportunities N-S fit*, *psychological N-S fit* and *challenge N-S fit*. Here, the indicator of *psychological N-S fit* include factors such as support, job-safety and recognition.

6.3.2 Categorization of indicators

Looking at the identified indicators, it is not immediately recognizable to which indicator applies to which level or levels of fit. In order to put them in the framework, they first need to be categorized. In this section, this categorization will be performed and elaborated upon.

Recall that, as argued by Herdman & Carlson (2009), borders between different fit the different fit perspectives can be ambiguous as the fit between certain attributes can fall into multiple fit perspectives. It has to be said however, that while this is the case, some indicators that fall into multiple fit perspectives are not the same for both measures. Take personality congruence for instance. While it is an indicator for both person-organization and person-group fit, one can have a very good fit with the overall personality or culture in the company, but not fit well at all with the personalities of the people in their team and visa versa. In the construction of the framework, they must therefore be treated as separate indicators.

In order to make an overview of where which indicators belong to which of the four fit perspectives, while still allowing for indicators to fall into more than one of these perspectives, the Euler diagram in Figure 6 was constructed.

In this diagram, there is a set of indicators which could apply to all four perspectives of fit. For *growth opportunities N-S fit*, this is because an individual has needs for a certain level of growth in their work environment, and in some organizations, teams, vocations and jobs these growth opportunities are more extensive than with others. Another general indicator is that of the KSAs *D-A fit*. An organization, and group might look for someone with a certain set of competencies to fill in a knowledge gap or to bring in some expertise for a certain project. For a vocation or job, having a certain set of KSA's is generally required in order to be properly able to successfully fulfill job-specific or vocation-specific tasks. Take for instance an emergency services vocation. A job in that vocation could be a paramedic. For this job, but also for this vocation, you need have the ability to stay calm in intense situations and have good communication skills.

Some indicators are a part of three of the four fit perspectives. These include for instance *experience D-A fit* which is a part of person-organization fit, person-group fit and person-job fit. For an organization a certain level of experience is demanded when the organization operates on a high level. Such an organization could for instance be a Michelin star restaurant. They will not be likely to hire employees without experiences working in a restaurant. The degree of experience will therefore significantly influence the level of complementary person-organization fit. Similarly, experience has an influence on the complementary person-group fit as a group may be too inexperienced. Therefore, an individual with a certain level of experience could fill the gap of a certain lack thereof. Recalling from Chapter 3 that the definition of complementary fit is fit that occurred when a gap in the current work environment is filled by the individual or if the work environment fills in a gap in the needs of the individual (Kristof, 1996), the level of *Experience D-A fit* influences the level of complementary fit. And, naturally, a certain level of experience is often required for a certain job in order to be able to properly fill the position. Hence, *Experience D-A fit* is also an indicator for person-job fit. Another indicator that is part of the same three fit perspectives would be the *social N-S fit*. For person-organization and person group fit this is the case as they are both facets of a work environment from which social activities can be hosted. For the job level, a certain degree of need for social interaction could be satisfied by the level of social interaction is warranted for the job or option one has in a job to socialize with either clients or collogues. Though some vocations can supply and therefore fulfill the need for an individual to have a certain level of social interaction, there can be a such significant difference between the level of social interaction that can be supplied by the jobs within a certain vocation. Take for instance the vocation of healthcare work as an example. Doctors are a part of this, talking to patients daily. Conversely, most medical researchers would spend a lot less time talking to patients. Therefore, it is not considered to be a good enough indicator for person-vocation fit.

Recall from Section 3.2.3 that *goal congruence*, *value congruence*, *norms-attitude congruence* and *personality congruence* have been shown to be predictors of supplementary person organization fit and

person-group fit (Kristof, 1996; Gardner et al., 2012; Iyer, 2019). Though having complementary characteristics, such as different personality characteristics than others in the work environment should theoretically also result in a higher level of fit, such a relationship is found to be much weaker (Piasentin & Chapman, 2007). Therefore, this thesis focuses on the similarity of these characteristics as they are significantly stronger predictors of fit. It has to be noted however, that while a higher level of fit as a result to a higher level of similarity in characteristics will result in more beneficial outcomes, having a work environment full of homogeneous employees can have negative effects as well as personality conflicts can arise (Jones, 2017). Still, most of the negative side effects that are associated with homogeneous teams arise due to homogeneity in ethnicity, KSAs and experience of which the former is disregarded due to ethical considerations. Furthermore, the latter two are considered in this framework as something that is demanded by the job, work group or vocation, and therefore it is considered in the indicators of complementary fit.

Psychological support and satisfaction is regarded as something that is provided by the organization or work group and therefore, the indicator *psychological N-S fit* is considered to be an indicator for supplementary person-group and person-organization fit.

Financial N-S fit is considered an indicator for complementary fit on those levels that determine what an individual gets as financial compensation. These levels are the organizations, as they vary in pay ranges and benefits and determine these factors, and the job itself, as that is what determines what the individual actually gets paid. An indication to this might be the vocation, but similarly to the indicator of *social N-S fit*, the differences between occupations within a vocation are too great to be considered a good indicator for complementary person-vocation fit.

Similarly, the indicator of *travel opportunities N-S fit* is considered to be a part of person-organization and person-group fit. The reason for this is that travel opportunities are provided by organizations and are to some degree associated to their level of internationality and moreover substantially determined by the job description. Therefore, it is hypothesized that the extent to which an individual's needs for traveling opportunities are met, positively influences the level of complementary person-organization and person-job fit.

Another shared indicator of person-job and person-organization fit is *commutability N-S fit*, which influences the complementary fit with regard to those aspects of the work environment because they determine the frequency and distance of the commute for the individual.

Next to shared indicators for person-organization and person-job fit, there exists an indicator that shares two other fit perspectives is that of *interest congruence* is found to be a predictor of both person-job and person-vocation fit (Ehrhart & Makransky, 2007)

Lastly there are some indicators which are only applicable to one singular fit perspective. These include *challenge N-S fit*, *commitment D-A fit* and *time D-A fit*. Since the level of challenge, needed commitment & required time investment are all very dependent on the job, the level of compatibility between the work environment and individual on these aspects are considered to be indicators of complementary person-job fit.

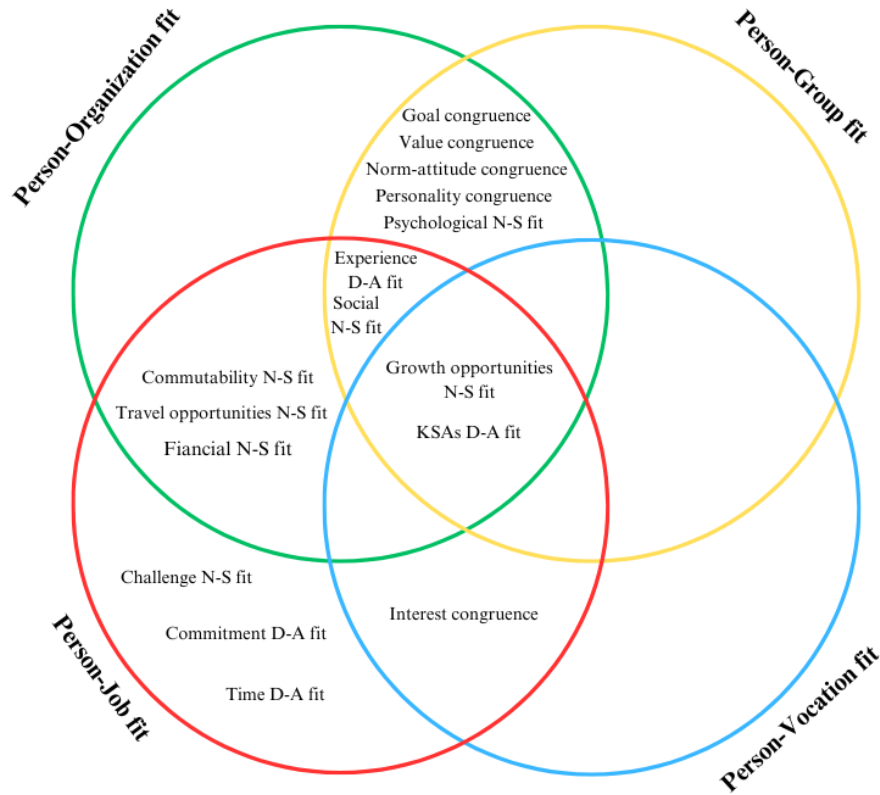


Figure 6: Euler diagram categorizing different indicators of fit

6.4 A comprehensive framework of P-E fit

Using the categorization of the indicators from Figure 6, and the layout as elaborated upon in Section 6.2, the left two columns of the framework in Figure 7 were constructed. To create an overview of the attributes of the individual, a column without rows was added on the person side of the framework on the right titled *overall*. Here the attribute types were titled to signify what they represent of the individual; (i) who they are, (ii) what they are looking for and (iii) what they have to offer.

The use of this framework will be explained through three cases; (i) how the framework could be used by an individual looking for a job, (ii) how the framework could be used by a manager assessing how to improve the performance in their team, and (iii) how the framework could be used by an organization looking to fill a position.

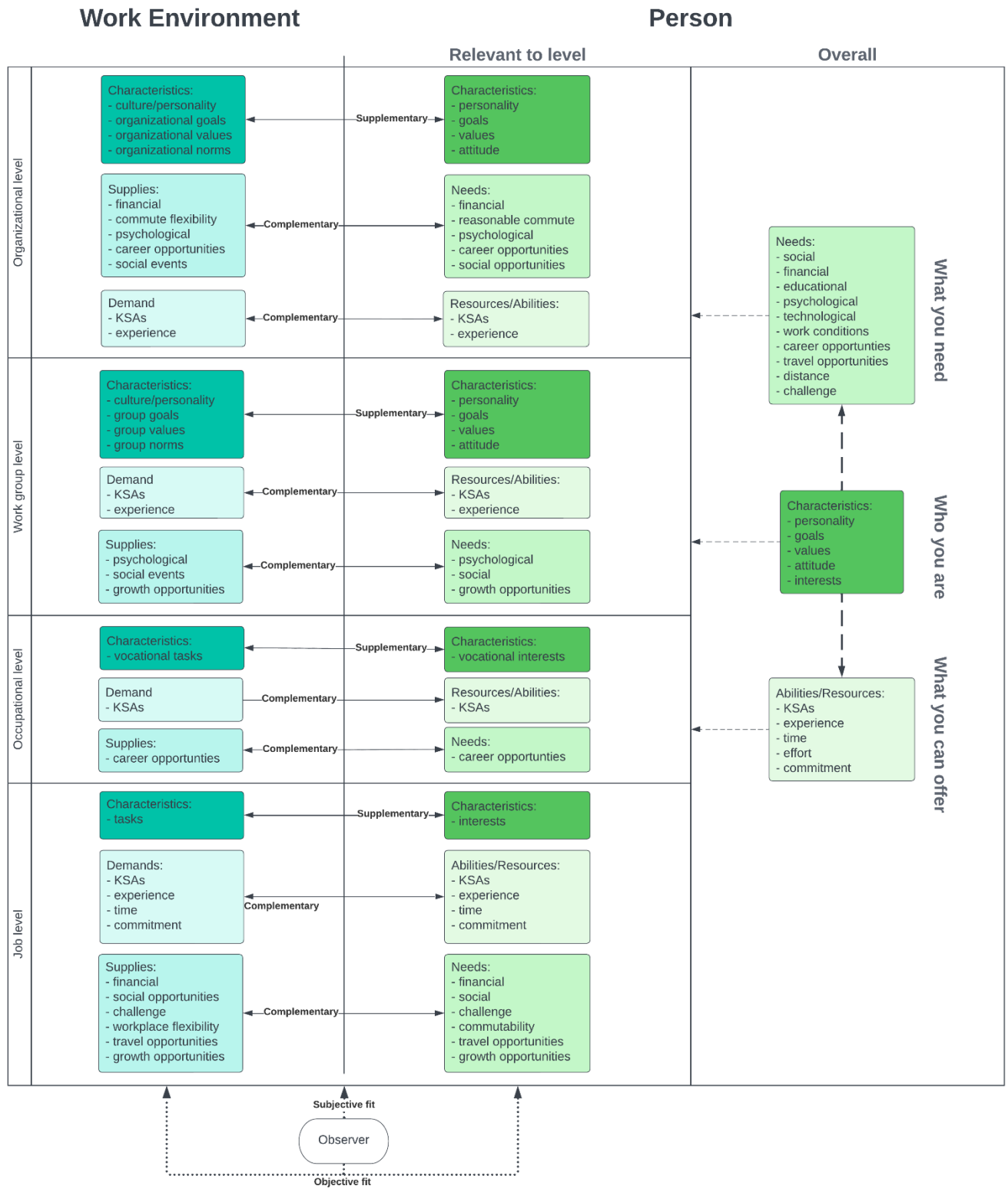


Figure 7: A comprehensive framework for P-E fit

6.4.1 Case 1: How to use the framework of P-E fit to look for a fitting job.

For an individual looking for a job the framework could serve as a good overview of what to look for and what to think of when applying for a first or new job in order to gain a higher chance of them being satisfied with their new job as a higher level of fit results in higher job satisfaction (Kristof-Brown et al., 2005).

A good starting point for such an individual would be to assess for themselves who they are, what they are and what they are looking for. In other words, they should look at the right side of the framework and figure out for themselves their needs, characteristics, abilities and resources.

In order to subsequently narrow their search, they could look at the occupational or vocational level to see if they can find a fitting vocation type. As they might not have any experience of being active in most vocations, they could best assess the fit through the comparison of their attributes with the attributes of each vocation which could be found using an internet search. For the vocation of marketing for instance, it can be found that required KSAs include high creativity and analytical skills (Petrie, 2022). To determine the level of complementary demands-abilities fit, one would have to assess to what extent they possess those skills.

After a fitting vocation has been found, the individual can go about the rest of the search process in two ways; (i) by first looking for a fitting job and then assessing the fit with the organization with the open position, or (ii) by first searching for a fitting organization and then looking for a fitting open position there.

If the individual would choose the first option, they could best search for jobs included in the most fitting vocations and then search for tasks such a job would carry with it and see whether or not those task match with their interests. Consequently, they could search on job searching websites such as Indeed for job openings using the job with the within the fitting vocation with the fitting task description as a search term. Then, the details of the open positions should give them with more information on the job. This information can be used with the framework to make an assessment of the fit the individual has with each job. If an individual would for instance show high levels of fit with the vocation of marketing, they could look for marketing jobs on job searching websites to find information about the job description and characteristics (e.g. salary) of different jobs in marketing such as public relation specialist or advertising sales agent. Using the assessment of person-job fit they can then find which jobs in a certain vocation would best suit them.

After that, an assessment can be made of the level of objective fit of the individual with the organization the most fitting open positions are at. The information on the attributes necessary to make such an assessment can mostly be found on the internet and perhaps using information gained during the application procedure. The benefit of using this first option would be that the fit with a job would be prioritized. Because of this, they can use a wide range of job finding tools to find a fitting organization, which is why they will probably be more likely to find a fitting job first. Next to that, since person-job fit is the strongest predictor of job satisfaction (Kristof-Brown et al., 2005), this method would increase the likelihood of achieving high job satisfaction through ensuring there is high person-job fit.

If an individual would opt for the other option, starting with the search for a fitting organization, they would use their most fitting vocations and look at organizations which operate in area's where those vocations can frequently be found. They would then assess their objective fit with the attributes of each organization they find. Subsequently they would look at open positions at the most fitting organizations, assessing their objective fit through the comparison of their attributes with the job attributes of the open positions. They would apply for the positions where they show the best objective person-job fit in the organizations where they show high objective person-organization fit, operating in an area with vocations with which they show high person-vocation fit. The benefits of using this option would be that the fit with the organization will be

6.4.2 Case 2: How to use the framework to improve a team's performance

When evaluating points of improvement for the performance of a team or work group, a manager could use this framework of person-environment to identify points of evaluation and points of improvement. Since, as mentioned in Section 3.2.2, person-group fit is found to be positively related to not only performance, but also to other beneficial outcomes such as job satisfaction, organizational commitment and retention rate (Kristof-Brown et al., 2005). Each of these other outcomes can also positively influence the performance in the future as the retention of employees ensures the retention of knowledge and expertise in the team, a high level of organizational commitment ensures team members are more likely to 'go the extra mile to achieve their goals' and satisfaction in the team improves well-being (Sironi, 2019), ensuring that they are available more regularly.

Having established how person-group fit can stimulate performance, it should be assessed how person-group fit within a team can be improved. In order to do this, the level of person-group fit first has to be assessed for the team members. Since the team members are likely to already have some experience working in the team, they can be deemed to have enough experience to assess their fit with regard to the attributes on the group level of the framework for themselves. Recall from 3.2.1 that this is arguably better than an objective evaluation of fit as it is likely to be more strongly related to the beneficial outcomes of fit (e.g. Ehrhart, 2006; Garavan, 2007; Ehrhart & Makransky, 2007). Therefore, the manager could best compose a questionnaire asking the extent to which each member of the team perceives they fit with regard to some the attributes of the group. The questionnaire could for instance ask to what extent the individual feels they fit into the group personality or culture, to what extent they feel they agree with the team values, to what extent they feel they possess the knowledge, skills and abilities to fulfil their tasks, or to what extent they feel they are given enough opportunities to grow professionally.

Having assessed the subjective fit of the team members, points of attention can be identified. A manager can for instance see that some additional guidance is needed, some additional training in certain areas is necessary, or that some values might have to be changed. A good next step to tackle such points of attention would be to start a conversation about them with the team members to find out the nature of these issues and take the necessary steps to improve the perception of fit in the team.

6.4.3 Case 3: How to use the framework to fill an open position

This framework can be used very effectively by an organization looking to fill an open position. In order to do that they first have to have a clear idea of the attributes of the company on some different levels. These levels would be the organization, the group and the job levels in the framework. The group level in this case should be about the work group the new applicant will be most likely to work with. The focus however, should be on the organizational level and the job level. In order to prioritize the most important attributes, the organization should score or rank them individually.

When a clear picture is constructed of what the organization is like in terms of characteristics, what the organization is willing to provide a new employee, and what the organization is looking for in an employee, they have to construct an application and selection procedure that allows them to gain the necessary information to objectively compare the fit with each attribute. This will most likely entail that the resumes will be screened on the demanded competencies and experience. Next to that they could ask applicants to perform a personality test so it can be compared to the organizational and team culture. In further interviews questions can go into goals, values, attitudes, interests, and needs that the individual has. These can then be used to further compare them to similar attributes in the organization to assess objective fit on different levels of the work environment.

The benefit of looking for a fitting person beyond their competencies is that a more complete assessment of the overall level of fit of an applicant with regards to all the relevant aspect of the organization, team and

job can be made, making it more likely that the applicant will show higher job satisfaction, performance, commitment and will be less likely to leave the organization (Kristof-Brown et al., 2005)

6.5 Conclusion

In this chapter, we have succeeded in constructing a framework of P-E fit that builds upon previous frameworks and in which all four underlying fit perspectives of P-E fit have been adopted. The framework shows how the similarity or complementarity between the attributes of an individual and those of a work environment can be an indicator of the level of fit of the individual with a certain aspect of the work environment. Therefore, it shows how levels of fit are obtained through the interaction between the attributes of individuals and a work environment. The framework has also made a distinction between demands-abilities and needs-supplies fit. And lastly, we have made an attempt visually capture the difference in measurement between subjective and objective fit into the model.

It has to be said however that while this framework can definitely serve as a helpful tool in many practical applications as we have shown in Section 6.4, it is likely to still be the subject of different discussions. One of the major points of discussions would for instance be which indicators should be included and even more so to which of the four fit perspectives they would belong. Many examples can be thought of that would justify some indicators to be removed from or added to one or more of the fit perspectives. This is mostly due to the ambiguity of borders between some of these perspectives as pointed out by Herdman and Carlson (2009). It is therefore important to mention that when using this framework, indicators from other perspectives that might not immediately seem relevant might also be useful to consider.

Still the literature, arguments and use cases given in this chapter should serve as some proof of its soundness and practical use. It will therefore be used as a starting point for the identification and justification of possible improvements for the BedrijvenWijzer.

7. Selection of Contextually Relevant Indicators

In this chapter, the second sup question as posed in Chapter 5 will be answered, namely: *what indicators are relevant for the context of this research?* In doing so this chapter aims to present a comprehensive overview of the relevant indicators of fit in the context of a digital matchmaking algorithm between students and regional companies, along with a representation of their relative importance.

The method employed to select and rank the relevant indicators is specified in Section 7.1. In Section 7.2, these methods will be executed. The relevance of indicators will be discussed using the framework established in Chapter 6 after which a selection will be made. The indicators in this selection will subsequently be scored and ranked according to a set of ranking indicators. Finally, results will be performed in a model, along with an explanation of how these results should be interpreted and used. This will happen in Section 7.3 after which, this chapter will be concluded in Section 7.4.

7.1 Method

From the collection of possible indicators of fit obtained from literature and listed in the framework showed in Figure 7 in Chapter 6, the most relevant indicators for the context of this study have to be selected. But what determines the contextualized relevance of these indicators?

First of all, the contextual relevance of each fit perspective should be assessed. This will be done mostly through reasoning, keeping in mind the goal and convictions on which the *BedrijvenWijzer* was built. Therefore, each fit perspective will be assessed and potentially disregarded or weighted.

Next, in order to make a further assessment of the relative contextual relevance of each indicator, the *Multi-Attribute Utility Theory* (MAUT) will be used (Jansen, 2011; Peek, 2023). Doing so allows for a quantitative, systematic and comparative way of evaluating the different indicators and should provide a good basis for the ranking of indicators of fit perspectives. The MAUT consists of the following steps (Von Winterfeldt and Edwards, 1986 as cited in Janssen, 2011):

1. Defining alternatives and value-relevant attributes.
2. Evaluating each alternative separately on each attribute.
3. Assigning relative weights to the attributes.
4. Aggregating the weights of attributes and the single-attribute evaluations of alternatives to obtain an overall evaluation of alternatives.
5. Perform sensitivity analyses and make recommendations.

Following these steps, first, a list of alternative indicators and scoring criteria or attributes have to be formulated. The list of relevant indicators to consider for scoring will be constructed by taking the indicators represented in the framework in Figure 7 as a starting point. By discussing the relevant levels to consider with *BedrijvenWijzer* and by reasoning, it will be judged and elaborated upon which indicators are to be scored and ranked. The ranking criteria will go into aspects such as measurability, relationship strength to perceived fit and beneficial outcomes and relevance to regional companies and students.

Using the criteria, an assessment of the selected indicators can be performed. This will be done by scoring each alternative indicator on a scale of 0 to 5. This scale will be determined and described beforehand in order to allow for a more transparent and objective assessment. For transparency purposes, the scores of each indicator will be provided with a short motivation.

Consequently, each criterion or attribute should be weighted according to their relative importance to the context of the *BedrijvenWijzer*. Then, each indicator should be given a weighted score. This weighted score would be the initial given score for a certain criterion, multiplied by the weight of the criterion in question.

This would result in a list of scored indicators. The relative score of each indicator should provide a ranking functioning as a representation of the relative contextual importance of the indicators.

Finally, a sensitivity analysis will be performed to get an idea of how sensitive the results are to slightly different weights and scores. With this sensitivity analysis the results will be reevaluated, and a conclusion will be drawn. The most contextually relevant indicators will be visualized into a model that ranks each indicator and so represents how the inclusion of an extra “tier” of relevant indicators can lead to a more accurate, but also more time-consuming tool.

7.2 Determining the indicators and criteria

7.2.1 Relevance of perspectives and underlying indicators from the framework

Looking at the framework in Figure 7, maybe the most obvious question would be which fit perspectives to consider for a digital matchmaking tool such as the *BedrijvenWijzer*. Recall that the *BedrijvenWijzer* was introduced as a tool to match students and companies in the region on the basis of how well they fit with each other. This assessment of fit would be without looking at specific open positions or task specific information. In other words, the fit between student and company was attempted to be assessed exclusively from a Person-Organization fit perspective. The reason for this was that no specific information was needed on the characteristics of each job and team for which there would be an open position.

There are some benefits associated to such a decision. First of all, a company would not have to spend additional time providing data for each position and instead would receive a steady stream of talent who ideally would fit well with the company overall. When said talent would then be interested in taking on a position at that company, the company itself would be able to determine which position and team would fit them well. When a certain position would not fit well, the company can choose to let them try other positions. This way, talent will have the opportunity to explore their interests, talents and preferences at a company that should fit them well regardless of the position they try out. For students, such an opportunity would probably be better than being asked for specific information on aspects of a job they are looking for while having little to no clue or experience.

Still, there are also significant drawbacks associated to taking a similar approach. First of all, matching students and companies solely on the perspective of P-O fit would limit the predictability of the tool on the compatibility between the student and the work environment that can be provided by the company. And, therefore, the tool would be somewhat less likely to accurately predict beneficial outcomes such as job satisfaction, job performance and retention rate (Kristof-Brown et al., 2005). Another drawback could be that there is less room for differentiability between scores on indicators. This could potentially mean that the results of the matchmaking tool will be very sensitive to slight differences in scores, lowering the repeatability of results and therefore the reliability (Heerkens & van Winden, 2021).

After discussing both perspectives with *BedrijvenWijzer* it was decided to refrain from using indicators that are focused on position specific attributes such as the team and the job itself for now. Therefore, the fit perspectives of Person-Group fit and Person-Job fit and their indicators are mostly disregarded for possible indicators on which to base the matchmaking. Similarly, the perspective of Person-Vocation fit is disregarded as it refers to the fit with an overarching job type or vocation. On this, the company can provide very little data.

So, the perspective of Person-Organization fit is considered to be the most contextually relevant and therefore, only the indicators belonging to P-O fit will be mostly considered. Some however are less contextually relevant. One of this would be the indicator *experience D-A fit* since students can not be expected to have too much relevant experience on which to base matchmaking. This indicator will therefore not be considered in the scoring and ranking.

As mentioned in the conclusion of Chapter 6, due to the ambiguity of borders between fit perspectives, there might still be some relevant indicators to consider in the other rows of the framework in Figure 7. Looking at these indicators, the one of *time D-A fit* stands out. Mostly because it would be very useful in the context of a tool connecting students looking for different employment types (e.g. internship, part-time job or full-time job) with regional companies, to include a measure of time investment fit in the matchmaking tool. This way, a company could give information on which employment types they can provide and maybe what they expect in terms of working hours, and students can provide what employment type they are looking for and how much time they would be able to dedicate to this.

So, the indicators that should be considered, scored and ranked would be:

- *Personality congruence*
- *Goal congruence*
- *Value congruence*
- *Norms-attitude congruence*
- *Financial N-S fit*
- *Travel opportunities N-S fit*
- *Commutability N-S fit*
- *Psychological N-S fit*
- *Social N-S fit*
- *Career opportunities N-S fit*
- *KSAs D-A fit*
- *Time D-A fit*

7.2.2 Determining ranking criteria

For ranking criteria or attributes, there are some points that should be focused on. These points relate to the context and goal of the digital matchmaking tool. For such a tool, it is important that it is concise, reliable in its measurements, relevant for both types of participants and that it is effective in establishing high quality matches.

The conciseness and reliability in terms of measurement mostly depends on the measurability of the indicators. For that reason, the attribute measurability should be added to the list of criteria. In order to make a judgement on the extent to which each indicator is easily measurable some research should be done looking into how each indicator could be measured. This subject will be elaborated upon in the next chapter. The criteria *ease for companies to provide accurate data on indicator* and *ease for students to provide accurate data on indicator* have been added to take into account the fact that companies might not want to fill in very specific data or might not have some data available, as well as the fact that students generally are not yet fully aware about what they are looking for in a job, vocation, team or organization.

The relevancy of the indicators and the effectiveness of the matchmaking depend on several factors. First of all, they have to comply with or be a predictor of the interests of the company and the students as mentioned in Chapter 3.1. for that purpose, the criteria of *importance for companies* and *importance for students* have been added.

Furthermore, some criteria need to be added that judge the strength of the relationship with organizational attraction and beneficial outcomes such as job satisfaction, retention rate and organizational commitment. The former since a match will likely only be found successful if it the match is attracting to the students. The latter because matching on strong antecedents for such outcomes increases the likelihood of those beneficial outcomes to happen.

Lastly, two indicators were added going into the ease and relevance of implementation. These criteria are *measurability* and *differentiability*. The former concerns the extent to which an indicator can be measured and implemented in a limited number of questions since these factors are important to consider in a short questionnaire-based matchmaking tool like the BedrijvenWijzer. The latter criterion concerns the extent to which the measuring of indicators is likely to lead to different results. This criterion should be implemented since, if an indicator leads to results that are too similar, the matches as a result of these indicator results would be similar as well making it difficult to make the matchmaking meaningful.

To summarize, the following ranking criteria were selected.

- *Ease for companies to provide accurate data on indicator*
- *Ease for students to provide accurate data on indicator*
- *Level of importance for companies*
- *Level of importance for students*
- *Relationship to organizational attraction*
- *Strength of relation to fit and beneficial outcomes of fit*
- *Measurability*
- *Differentiability*

7.3 Results

As mentioned before, the scoring of indicators will happen on a six-point Likert scale of 0 to 5. This scoring has been chosen as it refrains from using a neutral middle point. This way, in the scoring, a choice has to be made between a positive and negative outcome. This not only helps in avoiding making a judgment and as it is applicable in most criteria. In Tables 3 to 10 in Appendix A, each significant indicator of fit that is identified is listed six times. Once for each selection criterion. With each indicator, a score and a short reasoning behind the score is given. An overview of the scores is given in Table 1.

As mentioned in Section 7.2.1, according to the *Multi-Attribute Utility Theory* or MUAT, the criteria should be weighted as well according to their relative importance. However, since they are all considered to be similarly important to the context of the BedrijvenWijzer, it was opted to refrain from assigning these weights. The total score of each indicator will therefore be the sum of their respective score on each criterion.

	Ease for companies	Ease for students	Importance for companies	Importance for students	Relation to organizational attraction	Relation to other outcomes	Measurability	Differentiability	Total
Personality congruence	4	4	3	5	5	5	5	5	36
Goal congruence	4	3	4	3	3	5	4	4	30
Value congruence	4	4	5	5	4	5	5	3	35
Norms-attitude congruence	5	5	4	3	2	3	4	3	29
Financial N-S fit	3	2	3	4	3	3	3	1	22
Travel opportunities N-S fit	3	5	3	5	4	3	4	2	29
Commutability N-S fit	3	5	3	4	4	4	4	3	30
Psychological N-S fit	3	3	3	3	3	5	3	3	26
Social N-S fit	5	4	3	4	4	4	4	3	31
Growth opportunities N-S fit	5	5	3	5	5	5	3	2	33
KSAs D-A fit	4	5	5	5	3	5	4	4	35
Time D-A fit	5	4	5	5	3	4	4	3	33

Table 1: An overview of the scores given to the indicators on each ranking criterion

7.3.1 Ranking the results

In order to be able to give a representation of which indicators could best be used in the matchmaking tool that is the *BedrijvenWijzer*, a framework will be constructed. This framework should include the relevant indicators in such a way that the developers of the *BedrijvenWijzer* can easily see which indicators have the highest priority of being implemented. Therefore, if they decide they can add more questions to the questionnaire for instance, they can easily inform the framework to see which indicator would be the most useful to implement next.

Looking at the total scores given to each indicator, it is immediately visible that the indicator *Financial N-S fit* is not a suitable indicator in the context of *BedrijvenWijzer* compared to the other indicators since its total score is considerably lower. It will therefore not be considered in the framework. Taking the remaining indicators, the framework in Figure 8 is constructed. This framework indicates that as more indicators are added with lower priority, a fuller assessment of the total level of fit between a student and a company can be measured. Implementing more indicators will however require a more extensive measurement instrument leading to a lower participation and completion rate and to a lower level of response quality (Galesic & Bosnjak, 2009). The choice of the number of indicators to implement would therefore be a tradeoff.

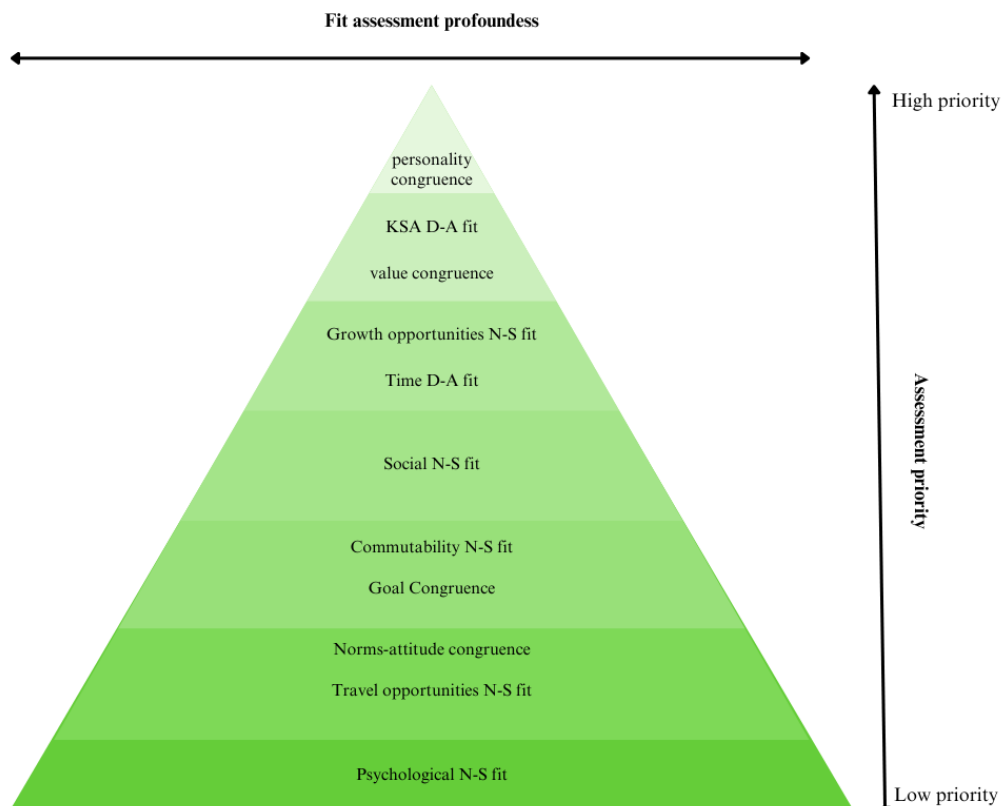


Figure 8: A framework for determining the implementation priority for relevant indicators of fit in the context of the *BedrijvenWijzer*

7.4 Conclusion

In this chapter, we have established a set of indicators which are contextually relevant to implement in the BedrijvenWijzer. Furthermore, we have assessed and ranked these indicators according to a set of criteria which align with the goals and criteria of the BedrijvenWijzer. The most relevant indicators were implemented in a framework which depicts in which order the indicators should be implemented in order to result in a more extensive assessment of fit. It was also discussed how the selection and implementation of additional indicators is a tradeoff between (i) having a more complete and accurate view of the level of fit between a student and a company, and (ii) requiring a longer measurement instrument leading to lower respond rates and respond quality (Galesic & Bosnjak, 2009).

So, we now have provided the means to select the most relevant indicators to base matchmaking on in the context of the BedrijvenWijzer. In order to be able to actually implement these indicators however, it has to be decided how these indicators can best be measured. This will be addressed in Chapter 8.

8. Measurement of Contextually Relevant Indicators

This chapter aims to answer the third and fourth sub question as posed in Chapter 5. That is; ‘*How can these indicators be measured for students and companies?*’ and ‘*How can a digital matchmaking tool be constructed in such a way that it measures the indicators and provides meaningful matches while still being quick, intriguing, easy to use and able to provide the participating companies with more visibility among students?*’. So, this chapter will consist of two separate parts; (i) one aimed at selecting contextually relevant measures for the most important indicators identified in Chapter 7 and (ii) one that explores different existing matchmaking tools to see whether alternative approaches to matchmaking could make aspects more accurate, engaging or effective in suiting the needs of students and companies.

Section 8.1 will elaborate on the methods employed in the search for contextually suitable measures and matchmaking methods. Next to that, a set of criteria will be listed for the measures and matchmaking methods that are in line with goals and criteria of the BedrijvenWijzer. After this, the focus will first be on the selection and construction of suitable measures of the most important indicators as identified in Chapter 7. In Section 8.2, these measures will be selected, constructed and assessed accordingly. Then, in Section 8.3 alternative matchmaking methods will be discussed and their relevance and potential application in the context of the BedrijvenWijzer will be assessed. Finally, in Section 8.4, the two parts will be combined and a conclusion will be drawn.

8.1 Method

This section will address how this chapter aims to find an appropriate way of measuring the most important indicators identified in Chapter 7 and apply these findings in the BedrijvenWijzer. To properly explain how this is done, the flowchart in Figure 9 was added. Starting on the left, this will start by establishing the methods that will be employed to find suitable measures and matchmaking methods.

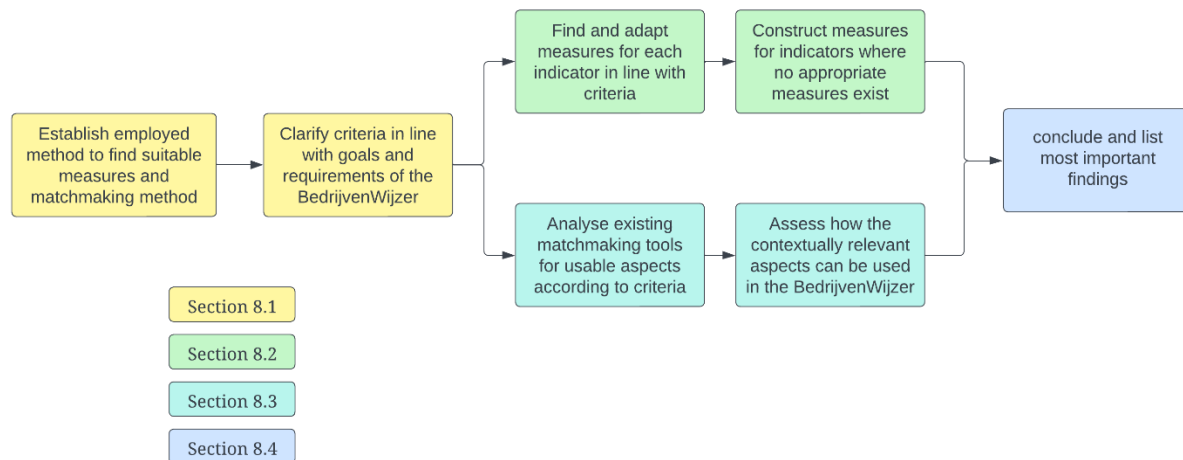


Figure 9: Overview of the method employed for finding appropriate measures and matchmaking methods.

Following these steps, first in Section 8.1.1, a set of criteria will be constructed according to the goals and requirements of the BedrijvenWijzer. A separate but related set of criteria will be listed for the assessment of measures and matchmaking methods.

The measures that are assessed will be constructed next. For the sake of time and to refrain from superfluous work, it was opted to only work out the measures for a selection of the relevant indicators listed in Figure 8. Hence, measures will be suggested for the top four priority tiers in Figure 8. For ideas how the remainder of the indicators in Figure 8 can be measured, some ideation is given in the reasoning column in Table 9 of Appendix A.

Recall from Section 3.2.1 and from the framework in Figure 7 of Chapter 6, that fit constructs and the level of similarity or complementarity can be measured both subjectively and objectively. Both of these measurement methods will be explored and their usability will be assessed. After that, a list of possible items will be constructed for each of the indicators listed in the top four tiers of Figure 8. This will be done by combining and adapting existing items from literature where possible, with new made-up measures. In order to make sure that the items are in line with the goals and requirements of the BedrijvenWijzer, items will be adapted according to the list of criteria.

Then, in order to assess how the matchmaking can best be done, alternative matchmaking tools will be discussed to assess whether their matchmaking method could benefit the BedrijvenWijzer in some way. In order to make this assessment, the list of criteria will be used.

8.1.1 The assessment criteria

Following the steps of the current section as described on the left in Figure 9, a list of criteria will be clarified. These criteria are meant to represent the requirements and goals of the BedrijvenWijzer. Therefore, by assessing alternative measures and matchmaking methods according to these criteria, we will ensure that these measures and methods will be applicable in the BedrijvenWijzer without altering its essence.

Recall from Chapter 1 that the BedrijvenWijzer aims to match regional students and companies in a way that is relevant to both parties, appealing to students, not time consuming, understandable, accurate and that increases the visibility for regional companies to students. From these requirements and goals, the criteria in Table 2 can be identified for the measure and matchmaking method respectively.

	Measure	Matchmaking method
Relevant	Should only contain contextually relevant items.	Applicable to the context of the BedrijvenWijzer.
Appealing	Questions or statements should be posed in an appealing way.	Playful and varied. Allow for nice visualization.
Not time consuming	Number of items should be limited.	Quick in computation.
Understandable	The statements or questions posed should not be confusing or open to interpretation.	Intuitive to use and relatively transparent in showing how a match came to be.
Accurate	Should measure what they aim to measure or in other words be valid.	Refrain from using subjective weights in the computation of a match.
Increases company visibility		Allow for the visibility of multiple companies.

Table 2: How requirements and goals of the BedrijvenWijzer form criteria for the employed measures and matchmaking method.

8.2 Alternative measures for the most important indicators

As mentioned before, when assessing a level of fit between an individual and a (facet of a) work environment, a distinction is often made between two kinds of fit that imply how the level of fit was measured: (i) subjective fit and (ii) objective fit. Recall from Section 3.2.1 and as visualized in the framework in Figure 7, that subjective fit refers to the subjective assessment of the extent to which an observer feels there exists a level of fit between an individual and (an aspect of) the work environment. Objective fit on the other hand, refers to the objective assessment of similarity or complementarity between attributes of an individual and the same attributes of (an aspect of) the work environment.

In the current version of the *BedrijvenWijzer*, an objective assessment is used. This is a logical choice in this context as a subjective assessment can only be made by giving specific information about (an aspect of) a work environment. Subjective fit however, could still be assessed to some degree if a different matchmaking method would be opted. Another situation in which the assessment of subjective fit would be very useful is when you want to get valuable feedback as to the accuracy of the matchmaking tool. Since, if done right, the subjective and objective fit should be highly correlated, the level of similarity between the matchmaking score obtained through the objective fit assessment as used by the tool, and the extent to which an individual believes they would fit at matched company.

To provide *BedrijvenWijzer* with the material needed to make their own choices as to what extent and how they would implement any recommendation that will be given as a result of this research, a set of possible measurement approaches for objective fit and subjective fit will be given.

8.2.1 Objective Measures

In terms of measures there will be a distinction between two kinds: (i) multiple choice questions and (ii) scale questions. For the multiple-choice questions, there are some different options that could be considered. In some cases, it would be fitting to allow for the selection of only one answer, while in other cases selecting multiple answers should be allowed.

When it comes to matchmaking for multiple choice questions, in most cases it only be appropriate to allow both parties to be a match if they have given the exact same answer to a question, disregarding the other questions entirely. This is because these questions concern what a company and student are looking for in terms of job type, time investment, study background and study progress. If a second year Applied Mathematics student is looking for a place to work two days a week and a company is only looking for Master students that are about to finish their Technical Medicine study and that are willing to work full-time, they should not be a match regardless of how well they might fit together in terms of their personality or value congruence.

For the scale questions, a five-point Likert scale will be used. The main reason for this is that it is used by most of the established measures that were looked at (e.g. Iyer et al., 2019; Cable & Edwards, 2004). Next to that, it is hypothesized that students and companies might be willing to have a neutral option. Especially students might not have a clue what they are looking for in certain aspects of a company. A five-point Likert scale is therefore considered more suitable than a six-point Likert scale. Even though a same type of scale is used. The actual description of the scales can differ somewhat depending on the indicator it is measuring.

In terms of making questions more appealing, or specifically, more appealing to students, options to do so are sometimes somewhat limited. That is because it tends to make them less clear or more distinct from what you aim to measure and therefore less appropriate to match with the answers of the company. In the scales however, there is more room to do so. Especially in a description of what a certain end of the scale would mean. For instance, when writing a statement such as *I am not easily stressed* using a five-point Likert scale

ranging from *totally disagree* to *totally agree*, it would be easy to alter the scale to; *stress is my middle name (totally disagree)* to *I am always Zen (totally agree)*. This way, questions can be made more appealing while not altering their clarity. And while the scales are altered, it can still be clear what is meant with a certain scale.

When it comes to the matchmaking of scale questions, a scoring system should be used that measures the congruence or needs-supplies fit. This can be done by appointing scores to each question. The score given should be in accordance to the difference on the scale of said question. An example of such a system would be to give 1 point if a student and company both gave the same answer on a given scale. And subtract 0,25 for each step on the scale in which a student and a company deviate from one another. That way, if a student and a company are the complete opposite of one another on a five-point Likert scale, they would have a matching score of 0 on that particular question. The average score per indicator would then give the level of congruence or needs-supplies fit per indicator.

Using the discussed distinctions and matchmaking methods, possible measures for the indicators of the four highest priority tiers as listed in Figure 8 will be constructed. The reasoning behind these methods is given below in the order of high to low priority.

Personality congruence

For the indicator *personality congruence*, there already exists an extensive number of measures. Some of these are commensurate, treating the personality attribute on the side of the organization not as the company culture, like the current state of the BedrijvenWijzer, but as the personality of the majority of its employees (Kristof-Brown et al., 2005). Doing this allows an individual and a company to have the same metrics for their personality, making it easier to assess their level of similarity. Next to that, it increases the predictive validity of the measure (Iyer et al., 2019). Since one of the criteria states that the measures should measure what they aim to measure, or in other words be valid, it was opted to use such a commensurate measure.

Using the commensurate measure by Iyer et al. (2019), a list of 21 items is obtained assessing each of the Big 5 Personality Traits (Goldberg, 1999 as cited in Iyer et al., 2019); *emotional stability*, *extraversion*, *openness to experience*, *agreeableness* and *conscientiousness*. In order to adhere to the established list of criteria in Table 2, only 10 of these items will be chosen in such a way that each of the personality traits has two items to assess to what extent the individual and the company embody these traits. From these items, a set of statements is made for which the respondent can reply to what extent they agree with said statement. Since this is a scale question, a five-point Likert scale will be used, generally ranging from *totally disagree* to *totally agree* (Iyer et al., 2019). The actual personality congruence can therefore be computed using the matching method mentioned earlier in this section. The personalities, topics, items and used scale have been listed in and above Table 11 of Appendix B.

Knowledge skills and abilities demands-abilities fit

The easiest way to measure one's knowledge skills and abilities demands-abilities fit in the context of the BedrijvenWijzer would be to assess whether the study progress and study background comply with what the company is looking for. Would this matchmaking be performed on more experienced individuals, previous work experience and expertise would play more of a role. The question can best be posed in as a multiple-choice question, providing all the available backgrounds and study progress options as possible answers. It was opted to not include *languages spoken* as a topic for this indicator. The reason for this is that it is likely to allow companies to disregard individuals based on their nationality even though, in most cases, being able to speak English would suffice to communicate effectively.

Since a student does most likely not have multiple study backgrounds or progresses, they should only be enabled to select one of the options. The company however, can search for individuals with multiple study backgrounds and students in multiple stages of their studies. They should therefore be able to select multiple options.

As mentioned earlier in this section, for such topics in a multiple-choice context, in order to be able to be a match for one another, there should be at least one overlapping answer for each of the topics. The used questions and options are listed in Table 12 in Appendix B.

Value congruence

For value congruence there is already a well-established measure, which measures multiple value aspects related to the workplace; the Work Value Survey (Cable & Edwards, 2004). Here, eight core work values are identified: *altruism, relationships, pay, security, authority, prestige, variety, and autonomy*. Cable and Edwards (2004) used these core work values to compose a list of 24 items (three per core work value). However, to comply with the with the criterion of using a limited number of items from Table 2, an attempt was made to combine the items into a singular one per core work value. This resulted in the list of eight questions posed in Table 13 in Appendix B.

These items are posed as questions measuring the extent to which student or the company finds a certain characteristic of a core work value important. Since this is a scale question, a five-point Likert scale is used, generally ranging from *not important at all* to *extremely important* (Cable & Edwards, 2004). The actual value congruence can therefore be computed using the matching method mentioned earlier in this section.

Growth opportunities needs-supplies fit

Since no usable measure was identified in literature, a new one will be constructed. In this measure two main topics should be addressed which could be contextually relevant; (i) the possibility for students to make career advancements at the company, and (ii) the possibilities for students to follow trainings at the company. The first topic would be relevant match students looking to grow at a company to those companies where they might continue working after their internship or grow in after their initial position there. And on the other hand, also to be able to match those that are primarily interested in doing an internship or finishing their thesis to those companies that do not have this opportunity.

Since the objective needs-supplies fit is an assessment of to what extent an individual has needs and to what extent those needs can be provided by the work environment, they need to be posed differently to students and companies. This resulted in the set of items listed in Table 14 of Appendix 3. Possible answers are given on a five-point Likert scale, generally ranging from *none at all* to *a lot*. The actual needs supplies fit can therefore be computed using the matching method mentioned earlier in the introduction of Section 8.2.

Time demands-abilities fit

Since no usable measure for this type of demands-abilities fit, a new one was constructed. Here two different topics were identified that were relevant to assess: *job type* and *time investment*. Based on these topics two items were identified for each topic. One specific to the students and one specific to the companies. Similarly to the measure for the KSAs D-A fit, these questions are multiple choice. Contrary to the measure for the KSAs D-A fit however, both the students and companies should both be allowed to provide multiple answers since they both could be looking for multiple job types or be open to multiple time investment options. The items and options are given in Table 15 of Appendix B.

Similarly to the KSAs D-A fit, there should at least be one overlapping answer in each topic. It might however be interesting for the BedrijvenWijzer to implement a set of ‘honorable mentions’ where there is a list of those companies that scored high on all indicators but where this time D-A fit does not allow them to be a match. Therefore, the student and company can still consider one another for another time, allowing the companies to have more visibility among students even though they are not what the students are looking for at the moment.

Social needs-supplies fit

The social needs-supplies fit in this context will mostly concern the extent to which the student’s needs for informal socialization activities such as drinks and team building activities and outings match with the frequency in which such activities are organized at the company. A distinction here is made between drinks and team building activities and outings. The resulting items are listed in Table 16 in Appendix B. Somewhat similarly to the measure of growth opportunities needs-supplies fit, the scale used is a five-point Likert scale, generally ranging from *not at all* to *as often as possible*. The computation of the indicator that is social needs-supplies fit is done in the same way as the growth opportunities needs-supplies fit, using the method explained earlier in the introduction of Section 8.2.

8.2.2 Subjective measures

As mentioned in the introduction of Section 8.2, subjective measures require more information on which an assessment of fit can be based. So, in order to be able to measure the subjective fit of a student with a certain company on a certain topic such as personality, KSAs values, growth opportunities, time and social events, participating companies should first provide information on these topics. Then, providing this information to the students, an assessment of fit can be made through the judgement of the student. They could indicate to what extent they feel they fit with that specific aspect of the company on a scale on which matchmaking could be based. The matchmaking score could consequently be computed through taking the average subjective fit score with regard to all of the topics. Assessing the level of fit this way however, does not take into account the opinion of the companies on the level of fit with the student. Next to that, depending on how the information is provided, this process can be tedious. Especially if the student has to assess their subjective fit with multiple companies.

8.3 Alternative data collection and matchmaking methods

Now that different measures of the indicators identified in Chapter 7 have been explored. Different matchmaking methods will be explored in order to see how these measures can best be put to use in a way that suits the goals and requirements best. This section will aim to investigate the existing methods that are used in the broader context of digital matchmaking and data collection. These alternative existing methods will be explored and their adaptability to the case of digital matchmaking between student and company will be assessed according to the criteria in Table 2.

8.3.1 Matchmaking in a romantic context

As one can expect, a lot of matchmaking algorithms are incorporated into dating platforms aimed to match individuals on the bases of their romantic compatibility. A few of platforms will be looked into to review what type of algorithms are used and to assess whether they could be implemented in one way or another into a matchmaking algorithm matching students and regional companies.

Tinder

One of the most famous of these platforms would be Tinder. Tinder as a matchmaking tool is binary in nature in that the user obtains very limited information about another user, as well as an indication of what they look like. The user consequently uses this information to determine for themselves whether or not they would like to get to know this person further.

Which profiles are shown first to the user, is determined by the information they have put in their profile and the details they have given going into what they are looking for in a match. Next to that, tinder's algorithm used to be designed to provide the user with more individuals in the user's "league". It would do so using an Elo rating system where the more you are liked by people with many likes, the higher your score or rating becomes, providing you with more users with similar ratings (Tiffany, 2019).

Recently, tinder has adopted its algorithm into one that is more machine learning based, providing users with new options based on the characteristics of their previous likes (Tiffany, 2019). While the way the algorithm used to work using the Elo ratings would not be useful at all for the context of this research, the current algorithm that is more based on machine learning, taking into account the characteristics of previously liked individuals might be very useful in this thesis' its context.

The way such an algorithm would work could for instance be that an initial profile is constructed on both the student and the company side. For the company, this profile would require information on aspects such as what they do, what industry they work in, how their culture could be described as well as their goals and values. Furthermore, they could specify what they are looking for and what their boundary conditions would be such as the type of opportunity they provide or are looking for or what prior knowledge skills and abilities they require. On the student side it would then only be necessary to provide some initial information that could confirm that they meet the boundary conditions. After that they could see and like or dislike the provided characteristics, pictures and descriptions of the companies of which they have met the requirements. Using a machine learning algorithm, new suggestions of companies could be shown based on the previously liked companies.

eHarmony and OkCupid

Contrary to swiping based dating platforms such as Tinder, algorithm-based dating platforms like eHarmony and OkCupid are more scientific based and rely on an elaborate profile construction using a large set of questions (Anderson, 2023). The downside of this would be that setting up a profile elaborate enough to base the matchmaking on, generally takes quite some time. Next to that it requires a lot of knowledge on what makes people compatible romantically.

On the other hand, doing matchmaking like this could be more meaningful as it allows for matching based on compatibility rather than appearance and superficial information. Next to that, algorithm-based dating platforms generally provide its users with a significant match more quickly as they have more information to begin with to base the matchmaking on and do not require their users to endlessly swipe through candidates that are not necessarily compatible (Anderson, 2023).

Algorithm-based matchmaking is most similar to the current state of the BedrijvenWijzer. As pointed out in Table 2 however, the BedrijvenWijzer aims to not be time consuming. Therefore, the questions that should be filled in might not provide a sufficient basis say with certainty that matched parties are actually the most compatible.

8.3.2 Matchmaking in a political context

StemWijzer

As the BedrijvenWijzer was inspired by the idea behind the Dutch StemWijzer, it is only logical to further investigate this source of inspiration. The StemWijzer is a digital tool provided for potential voters with the idea that they gain additional understanding of In the StemWijzer, political parties are presented with a set of political statements. They are consequently asked whether they are for, against or don't have a particular opinion about a standpoint along with a short elaboration on why they have chosen said answer. Then, when there are elections coming up, potential voters are presented with the same set of statements. They have the option to see which parties are for, against or neither and why, however, they can also just form their own opinions. When the statements are finished the potential voters are asked which of the statements, if any, they find most important. Using this information along with the overlap in opinions for each statement of the parties and the voter, matching scores are presented with each political party. Next to that, an option is provided to see where opinions differ.

The scores are calculated by awarding a point for a particular match if the user and the political party agree on a certain standpoint and 2 points when said standpoint is deemed an especially important one by the user. In the end, the total number of points representing a match with a certain party is divided by the total number of points that could have been obtained and multiplied by 100% to obtain a matching percentage (ProDemos, n.d.).

Just like the StemWijzer, the BedrijvenWijzer is designed to inform and help their users orient the all the options available to them based on very limited information. It serves as an advice and an indication of compatibility rather than as something that should be taken over blindly as the data gathered is too limited for that (ProDemos, n.d.).

8.3.3 Matchmaking in a digital employment context

Now, the BedrijvenWijzer is not the first tool to help find job seekers and potential employers find one another. Other websites, apps and tools like Indeed, the British Jobmatch and the Dutch Techniek Bedrijven, and Joppr all use some form of digital matchmaking to match talent and companies based on some criteria. In finding a suitable way of obtaining data and in making decisions about them, it could help to look at these digital employment matchmaking platforms. And highlight potentially relevant points to consider in the construction of a digital matchmaking tool between students and digital companies.

Indeed & Jobbird

Jobbird and Indeed are websites that put numerous open positions online from numerous organizations along with information about the organization and the job. Examples of the given information would be what the organization and the team does, what the job would entail, what the pay would be like and what they are looking for in an applicant. Individuals looking for a job can consequently look for specific jobs or jobs linked to their studies via a search tool using inputs like keywords, background and location to find a list of jobs at companies that contain these keywords or that are within a certain distance of the individual.

In other words, these tools present specific open positions provided by organizations in a very transparent way with a specific set of information about the job. The matchmaking is left mostly in the hands of the user as they determine for themselves what they think their level of compatibility or fit will be with the given description of the job, its perks and the organization it is in. The benefits of such a system would be

that not a lot of personal information is needed from the individual and one can easily browse to available jobs. With a tool such as the BedrijvenWijzer, where one of its main goals is to make companies in the region more known to students, this is not a bad thing.

Still, it has to be said that, if a job or organization gets seen in such a tool, it does not mean that individuals will look at them more closely. Furthermore, the information that is given in tools such as Indeed and Jobbird is Job specific. The BedrijvenWijzer is more aimed at finding good matches between students and regional organizations rather than with specific jobs. And lastly, with such tools where a lot of opportunities are shown with only limited information, individuals are likely to be intrigued by jobs based on this superficial, limited information even though it should arguably not be high on their priority list. A strong example for this would be the salary.

Prospects' Job Match

Contrary to Indeed and Gradfeed, Job Match is a matchmaking tool which aims to categorize the user into one of 15 'job groups' using a set of 26 items questionnaire with a 6-point Likert scale. The 'job groups' each signify a certain set of shared KSAs and interests. As a result from the questionnaire, the job seeker gets to know to what extent they fit in each 'job group' and what positions are available to people with the KSAs and interests characterizing this group. The job seeker is therefore not necessarily matched to a certain company or job but rather to a 'job group'. Just like the ideal candidate for an open position is not described in terms of competencies, experience and background but rather in terms of what 'job group' is closest to the description of the ideal candidate.

Thus, similarly to the BedrijvenWijzer this tool aims to perform matchmaking through the comparative analysis on the basis of the answers of a short questionnaire. Dissimilar to the current state of the BedrijvenWijzer, matching happens between an individual and a "job type" that would fit well to the individual. Though this might make the results less personal to the organization as they are not necessarily coupled to a specific organization, it does help to make the results less sensitive for slight differences in answers from the questionnaire. And, would the results of a matchmaking tool be too sensitive to slight differences in answers the repeatability of results would decline making results less reliable (Heerkens & van Winden, 2021).

Techniek Bedrijven

Techniek Bedrijven is a foundation that is committed to making it easier for beta students and companies looking for technologically skilled students to find and get to know one another. They aim to provide companies with the best and most relevant pool of students available, and students with the most interesting companies according to their given preferences. Next to matching students and companies using a matchmaking algorithm that quantitatively matches the preferences of companies, looking for certain competences, study backgrounds and extracurricular activities, and the preferences for industries and job type (*Stichting Techniek Bedrijven*, n.d.).

The matchmaking tool used by Techniek Bedrijven is somewhat similar to the current state of BedrijvenWijzer in that it is specifically designed to match students and specific companies. However, the matchmaking algorithm aims to do so using taking into account fewer perspectives, looking more at KSA's and less at fit between characteristics such as personality congruence, value congruence, etc. Furthermore, Techniek Bedrijven uses their algorithm for a different goal in mind, namely, to match students and companies interested in one another in order to set up more relevant and interesting meetings between them at one of their career events or inhouse days (*Stichting Techniek Bedrijven*, n.d.). Though the application of the BedrijvenWijzer in such a context can be explored, it is not relevant for the scope of this thesis.

Joppr

Joppr is a matchmaking app that aims to match job searchers and job providers in a Tinder-like fashion. Similarly to Tinder, the idea behind Joppr app is to quickly go through a large number of candidates or companies and judge them on their profile which contains limited information about them. You can subsequently make the decision to like or dislike a candidate or company. If both parties liked one another, they are matched and contact is established (Joppr, 2022).

An advantage of this over BedrijvenWijzer's way of matchmaking is that it is a quick way of getting to know a large number of organizations over a relatively short period of time. Furthermore, it's an easy and playful way of matchmaking (Joppr, 2022). Still, the lack of information shown in the initial profile leads to a very superficial and one-sided view of both job seekers and job providers, therefore making the matchmaking less meaningful. Furthermore, it is not very transparent based on which information an organization is provided as a potential good match to an individual and visa versa.

8.3.4 What can be learned from existing matchmaking tools

In Section 8.3, numerous matchmaking tools and strategies have been analyzed and discussed. Their potential relevance to the development of the BedrijvenWijzer has also been assessed. Some aspects of these tools have been identified to be potentially interesting for BedrijvenWijzer in some way.

One of these aspects would be the binary interested/not interested way of matchmaking as used by Tinder and Joppr. Recalling the criteria for a fitting method for the BedrijvenWijzer as listed in Table 2, the method should be playful varied and allow for the participating companies to be visible. The (partial) implementation of such a system would definitely assist in satisfying these criteria.

Some other interesting aspects could be the option given to users of the StemWijzer to provide extra weight to those statements or subjects that they find most important to match with and the option that the StemWijzer gives to be able to see what political parties found and voted concerning a given statement. Implementing the former could aid in making the tool more effective through letting the users provide an extra weight to certain subjects rather than weighting subjects yourself in the computation of a matchmaking score. That way students and companies can have more meaningful matches in those areas that they value the most. The other aspect of the StemWijzer could be implemented in the BedrijvenWijzer by allowing the student to see at the end how a list of participating companies, ranked from high to low matching score, responded to certain questions. Or alternatively, as mentioned in *the time demand-abilities fit* part of section 8.2.1, by including a list of 'honorable mentions' of companies that theoretically have a high matching score but that do not qualify for a match as they do not match on the searched for attributes such as time investment, job type, study progress or study background. If it is visible in which of these aspects they formed a mismatch, students can still take them into account in a later stage of their studies or when a position opens at the company that is in line with their background and time investment. Introducing such functions in the BedrijvenWijzer could aid in its transparency and, above all, its provided visibility for participating companies.

8.4 Conclusion

In this chapter, an attempt was made to create a set of implementable measures for each of the five most important and contextual relevant indicators being: *personality congruence*, *KSAs demand-abilities fit*, *value congruence*, *growth opportunities needs-supplies fit* and *time demand abilities fit*. Furthermore,

multiple measurement methods and matchmaking methods were explored. All in an attempt to answer the question; '*How can these indicators (i.e. the most contextually relevant & important indicators) be measured for students and companies?*'. In doing so it became apparent that these indicators can most often be measured both objectively, as is done now, and subjectively, through for instance a Tinder like structure where some indicator specific information about a company or student is given and it is judged by the others to what extent they feel they would fit with this. Though the latter might be more time consuming, it would allow for more visibility among local companies which is one of the driving goals behind the BedrijvenWijzer. Such an implementation would also be more playful and possibly more intriguing to students. Still, playfulness could also be added in the BedrijvenWijzer through implementing a set of somewhat informal scale descriptions. It is hypothesized to be better to add this playfulness in the description of the scales of questions rather than in the questions themselves as this would likely negatively affect the clearness of the questions. It was also found that, while the BedrijvenWijzer does currently contain measures of personality and company culture, it might be better to implement these measures differently, measuring the similarity in personality and company culture characteristics through a commensurate measure as this enhances the predictive validity of such a measure (Iyer et al., 2019).

While most indicators can be measured both objectively and subjectively, there are some indicators which could best be measured objectively as preselection criteria rather than to measure a certain level of fit. The indicators for which this was identified to be the case are *KSAs demand-abilities fit* and *time demand abilities fit*. These indicators say something about what the company demands in terms of time investment and knowledge, skills and abilities. Using them as preselection criteria in a similar way as is done in the current version of the BedrijvenWijzer ensures that matches for companies have the required background and competencies and that company and student are aligned in what they are looking for in terms of employment type (i.e. internship, parttime job, bachelor assignment, etc.) and weekly time investment.

With these findings and with the questions created in Appendix B, the question of how the most important and contextually relevant indicators could be measured for students and companies was answered.

9. Discussion & limitations

In this chapter, the research results will be assessed to see how the findings could best be used and interpreted. The implementations as well as possible limitations will also be discussed.

The first of these research results was the comprehensive framework of P-E fit resulting from the research performed in Chapter 6. Although this framework in its entirety is not directly applicable in the context of the *BedrijvenWijzer*, there are a lot of elements which were. Next to that, the usability of such a framework in the context of job searching, recruitment, management and HR context was shown through a series of use cases. While some indicators in the framework do not yet have the empirical evidence in terms of their relation to a certain facet of fit to fully support its use in the framework yet, there are a lot of elements such as the congruence of goals, values and personality that have received significant attention in literature and can therefore be called indicators of person-organization and person-group fit with relative certainty. Still, it is good to point out that the use of the framework may be somewhat limited due lack of empirical support. Next to that, as mentioned before and as pointed out by Herdman & Carlson (2009), the borders between different fit perspectives can be quite vague. It is therefore not always easy to reason in which fit perspective certain indicators and their respective attributes are relevant. Certain indicators, which should be considered in some contexts could therefore be disregarded as they might now be looked over in a certain fit perspective. One example, is that there is no indicator present in the person-organization fit perspective, that has anything to do with the interest of an individual and the extent to which those interests are compatible with the industry in which the organization operates. Though such an indicator of person-organization fit can be expected to exist, no literature was found in which it was explored. A similar indicator was however explored in literature for person-vocation and person-job fit. But because it was not considered to be an indicator of P-O fit, it was overlooked as a possibly relevant indicator for the *BedrijvenWijzer* even though it very much could be. Having established these limitations, but also its extensive implications, it could be concluded that the framework could very well serve as a starting point for a well-established framework of P-E fit.

The second research facet went into how relevant indicators for the context of the *BedrijvenWijzer* could be selected, assessed and ranked. Though the resulting ranked indicators could all be considered to be very relevant, the employed method made sure that the order of implementation priority as listed in Figure 8 was mostly well supported. The results are therefore definitely considered to be usable. Still, there are some limitations and points of improvement. First of all, not all information that was needed to properly support each given score could be found in literature. Therefore, some scores were based on personal reasoning which meant that their trustworthiness is limited to my personal ability to employ such reasoning. And, given that some priority tiers depicted in Figure 8 only differ one or two points, this could quite easily lead to slight differences in the ranking and therefore to different indicators being selected in the final tool. Still, to avoid such errors, reasonings were provided along findings from literature where possible and scales were defined to make the scoring of indicators as reliable, objective and transparent as possible. Another limitation resulted from the fact that I employed the scoring method without keeping in mind that in the context of the *BedrijvenWijzer* it would not make sense to not take into account certain indicators such as the *time demand-abilities fit* and the *knowledge skills and abilities or KSAs demand-abilities fit*. The questions that result from including these indicators serve as match criteria. If a student and company do not match on the topics surrounding these indicators, there can not be a match at all since it would not result in anything since the company can not provide that what the student need and vice versa. Because this was not recognized in the ranking of the indicators, it looks as though they are not that relevant compared to *personality congruence* for instance while in reality, it would be more meaningful to at least match on such match criteria. In the final recommendation, these match criteria will therefore be pointed out to be top priority for inclusion.

The last research facet performed in Chapter 8 revolved around the measurement of indicators and the application of measurements of fit in a digital matchmaking tool that would be in line with the goals and

requirements of the BedrijvenWijzer. Here a number and measurement methods and measures were elaborated upon. Some of these measures have been established and analyzed in literature. Still, in order to adhere to the criteria in Table 2 designed to represent the goals and requirements of the BedrijvenWijzer, these measures often had to be made shorter by eliminating some items that measured the same construct. Doing this however is likely to limit the construct validity of that measure to some extent (Heerkens & van Winden, 2021). Some indicators that were deemed to be one of the most contextually important in Chapter 7 were not found to have contextually usable established measures in literature. Therefore, new measures had to be constructed. The topics and items in these measures were formulated according to what facets of the corresponding indicator would be most relevant for this particular context aiming to meet the established criteria where possible. Though the construct validity of these measures is limited since only the facets of the indicators identified as relevant were included, and even though the measures were not tested empirically yet, they have been well thought out and deemed to be clear. The given reasonings behind each established and constructed measure can be used along with some ideation on how to measure other relevant indicators that was given in the reasoning of the scoring of the measurability of indicators in Appendix A, to adapt and create measures for other indicators for which this thesis does not yet provide one. Next to that, the method for the assessment of subjective fit may be used to measure an indicator that is hard to measure objectively or, as mentioned in Section 8.2, in the context of evaluating the accuracy of the objective measures used.

In terms of the identification of possible matchmaking methods and tools, there were some limitations as to the information that was available on how certain existing tools actually perform matchmaking. Still, the main ideas behind each tool and interesting elements were identified relatively easily. These elements can be very useful in the consideration of BedrijvenWijzer to try out new methods of performing matchmaking.

Overall, this research made use of methodology, literature, reasoning and contextual knowledge to provide sufficient argumentation of why certain changes to BedrijvenWijzer could be beneficial for the effectiveness of the BedrijvenWijzer or the interests of its users.

10. Final Conclusion & Recommendations

This chapter is dedicated to summarizing the key findings of the research. From these findings a final recommendation to BedrijvenWijzer will be formulated and motivated.

As stated in Chapter 1, the goal of this thesis was to select a theory supported set of indicators and to design measures for these indicators on both the students and the company side. Some criteria were framed in that the resulting measures should refrain from using predefined and ambiguous weights and allow for an implementation that is intriguing for students, not time consuming and allow for participating companies to be more visible to students.

To make sure the resulting matches that would be formed using new indicators would be considered ‘good’ in the eyes of students and companies, a short literature review was started to investigate what a ‘good’ match would look like for these parties. It was found that companies would have some selection criteria which would be that the desired skills and study backgrounds of the student are met and that the desired employment type of the student, such as a job, side-job, internship, bachelor or master graduation assignment, are met by the availability of that employment type at the company. And, if those criteria are met, matchmaking should be on the basis of indicators that predict the extent to which the student will be interested in, and open to contact with the company. Matchmaking indicators should also predict how well the student would fit into the work environment that the company can provide, such that an eventual job, internship or assignment at the company would be likely to result desirable outcomes such as high job satisfaction, performance, commitment, personal well-being and retention.

A further review investigating what indicators determined the level of compatibility between an individual and their work environment led to the domain of fit theory that explores what determines one’s level of compatibility with the different levels of a work environment being the organization, the work group, the vocation and the job itself. The level of fit of an individual with each of these levels is described in *person-organization fit*, *person-group fit*, *person-vocation fit* and *person-job fit*. Fit theory also explores how these *fit perspectives* result in outcomes such as *job satisfaction*, *organizational attraction*, *organizational commitment* and *job retention*. Looking at the identified criteria for a ‘good’ match it was clear that fit theory should be a central motivator for the selection and use of indicators in the matchmaking tool of BedrijvenWijzer. So, with fit as its central construct, the main research question was: ‘*How can the most relevant indicators of fit between students and regional companies be measured efficiently and effectively and applied in a digital matchmaking tool?*’. In order to answer this, a set of sub questions were constructed.

As fit is an elusive construct with many conceptualizations (Piasentin & Chapman, 2006), it was found beneficial and necessary for the further use of its subjects, to first construct a framework that would capture how characteristics and attributes of individuals interact with the characteristics and attributes of different levels of their work environment to create a certain level of similarity or complementarity resulting in fit. Hence, the first sub question was: ‘*How can indicators of P-E fit be adopted into a comprehensive framework of P-E fit?*’. In the construction of the framework in Figure 7, it was found that, as has been mentioned by Herdman and Carlson (2009), fit perspectives can be somewhat ambiguous as indicators of one kind of fit can also be an indicator of another. Hence, in order to investigate the level of fit between an individual and one specific facet of the work environment, indicators for the level of fit with other facets of the work environment can still be relevant dependent on the context of the assessment. Furthermore, it was found and illustrated in Figure 5 and Figure 7, that indicators of fit consist of the measurement of similarity and complementarity in certain attributes and characteristics of the individual and the work environment. Finally, it was found that the framework in Figure 7 can be useful in multiple contexts such as in the context of recruitment decisions.

Similarly, it was found useful in the context of the BedrijvenWijzer. Therefore, it was used to answer the second sub question; *What indicators of fit are relevant for the context of this research?* A systematic

scoring of relevant indicators of person-organization fit was conducted. It was chosen to focus on person-organization fit as this is what the BedrijvenWijzer aims to do. The indicators that were deemed potentially contextually relevant from the framework were: *personality congruence*, *goal congruence*, *value congruence*, *norms-attitude congruence*, *financial needs-supplies fit*, *travel opportunities needs-supplies fit*, *commutability needs-supplies fit*, *psychological needs-supplies fit*, *social needs-supplies fit*, *career opportunities needs-supplies fit*, *knowledge, skills and abilities (KSAs) demand-abilities fit* and *time demand-abilities fit*. The scoring of these indicators according to criteria in line with those earlier mentioned with the goal of this thesis, resulted in the ranking in Figure 8. This ranking indicates that the five most relevant and important measures in the context of the BedrijvenWijzer were found to be respectively; *personality congruence*, *KSAs demand-abilities fit*, *value congruence*, *growth opportunities needs-supplies fit* and *time demand abilities fit*. Though this ranking is well supported, it is recommended to at least have some measure of *KSAs demand-abilities fit* and *time demand abilities fit*. The reason for this is that the indicators of *KSAs demand-abilities fit* and *time demand abilities fit* are indicators which can best be operationalized in this context to be preselection criteria, not allowing students and companies to match if the student does not possess the required skills or if they are not looking for the provided job type. This is similar to the current version of the BedrijvenWijzer. Dissimilar to the current version of the BedrijvenWijzer, it will be recommended to include some measure of *value congruence*.

In answering the last two sub questions: ‘*How can these indicators be measured for students and companies?*’ and ‘*How can a digital matchmaking tool be constructed in such a way that it measures the indicators and provides meaningful matches while still being quick, intriguing, easy to use and able to provide the participating companies with more visibility among students?*’. Multiple items were proposed, and multiple matchmaking methods were explored. Again, it is recommended that a distinction should be made between indicators that determine whether a combination of student and company qualifies for being a potential match, and indicators that determine the matchmaking score. The former would be *KSA demand-abilities fit* and *time demand-abilities fit*. They must be measured objectively, determining whether the demand of a company for a certain background or time investment would be in line with what the student has and can provide. For the indicators that would determine the indicator score, it was found that there are multiple ways in which they can be measured. They can be measured objectively, asking questions on certain facets surrounding the indicator construct and using a scale to measure the level of similarity between the answers of both the students and companies on these questions. However, they can also be measured subjectively, through an implementation that takes inspiration from matchmaking platforms such as Tinder and Joppr to allow for students and companies to set up a profile with information on the indicators and to consequently let them determine to what extent, or whether they feel they would fit with such a profile. It will be recommended for the BedrijvenWijzer to look into such methods as they allow for the companies to be more visible to the students. Similarly, it is recommended to the BedrijvenWijzer to explore the use of playful scale descriptions on the student side as they allow for a more intriguing experience for students while not affecting the clarity of the questions. A final recommendation for the BedrijvenWijzer on this subject would be to make use of commensurate measures when objectively assessing the personality congruence as this would be beneficial for its predictive validity (Iyer et al., 2019).

To go back to the main research question; *How can the most relevant indicators of fit between students and regional companies be measured efficiently and effectively and applied in a digital matchmaking tool?* The answer would be that the most relevant indicators of fit, being *personality congruence*, *KSAs demand-abilities fit*, *value congruence*, *growth opportunities needs-supplies fit* and *time demand abilities fit*, can be measured efficiently and effectively through an objective assessment of each of them in a questionnaire, or through the combination of an objective assessment on the KSAs and time demand-abilities fit and a subjective, Tinder like assessment of (some of) the other indicators.

Looking back at the goal of the thesis of selecting a theory supported set of indicators and to design measures for these indicators on both the students and the company side. They can be considered reached

as the most contextually relevant and important indicators have been selected according to criteria that are in line with the goals and requirements of the *BedrijvenWijzer* and a set of usable measures was presented. Next to that, this thesis provides *BedrijvenWijzer* with some useful tools which could aid them if they were to decide to take alternative choices. The established framework can for instance be used if *BedrijvenWijzer* would choose to assess the level of complementarity between student and company from more than the organizational perspective. Alternatively, if they were to decide to allow for a more elaborate questionnaire to increase the accuracy of their fit assessment, they could select the next most important indicator according to the ranking posed in Figure 8. Or, if they were to employ a different way of matchmaking, potentially with the aim of making it more appealing to students, a more tinder like approach to assessing fit can be implemented for the indicators for which this would be relevant to do so.

However, before taking such steps, some further research might be needed. It would be suggested for instance to empirically test the new indicators and measures before they would be implemented to see whether the resulting matches are actually perceived as suitable by both student and company. Next to that, it would be wise to verify whether the proposed indicators are sufficient. Since the indicators that were proposed by this thesis were rooted from existing literature, some indicators might be missing which could be very important. Further recommendations for future research for the *BedrijvenWijzer* would include the possible addition and relative contextual importance of a measure of interest-industry congruence, the empirical testing and evaluation of the tool in establishing a subjectively judged good match after a student has spent some time at the matched company, what the optimal combination of using objective and subjective measures would be in order to make the most accurate assessment of compatibility of a student with a company in a given amount of required time investment, and naturally, how the proposed changes and possible other changes, can best be tested and implemented in a tool that is already live.

using objective and subjective measures would be in order to make the most accurate assessment of compatibility of a student with a company in a given amount of required time investment. And naturally, how the proposed changes and possible other changes, can best be tested and implemented in a tool that is already live.

Another but related recommendation for future research would be the empirical testing and evaluation of indicators in the framework of P-E fit constructed in Chapter 6 and, the possible addition of new indicators in said framework.

To conclude, recalling again that the main research question posed in Chapter 5 was; ‘How can the most relevant indicators of fit between students and regional companies be measured efficiently and effectively and applied in a digital matchmaking tool?’, and having established (i) what indicators are the most contextually relevant for the *BedrijvenWijzer*, (ii) How the most contextually relevant indicators can be measured and (iii) how elements from existing tools and new measures can be employed to make the measurement and measurement tool more efficient and effective in achieving its goals, the main research question can be considered to be answered.

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Appendix A: The scoring of indicators

Below, the scores of each indicator with the corresponding motivation is given for each of the ranking criteria as indicated in Section 7.2. Below each criterion, a scale is provided to signify what each number means. The goal for this is to be both more transparent and objective in the scoring of indicators.

Ease for companies to provide accurate data on indicator

Used scale:

- 0 = (almost) Impossible to determine.
- 1 = Very specific information or very hard to obtain and provide information.
- 2 = Somewhat specific information or difficult to obtain and provide information.
- 3 = Somewhat generally known in the organization or relatively doable to obtain and provide information.
- 4 = Generally known information within the organization or easy to obtain and provide information.
- 5 = Widely known information within the organization or very easy to obtain and provide information

Indicator	Score (0-5)	Reasoning
Personality congruence	4	It might be hard to determine the overall organizational culture but there is generally some idea of what it is like. It would be better to evaluate and discuss with multiple employees.
Goal congruence	4	While the general goal of the organization is commonly known within the company. Why an organization does what it does is not always apparent (Sinek, 2011). This <i>why</i> however is what would most likely speak to an individual.
Value congruence	4	The values of an organization might also be quite hard to determine by the average employee if its not prominently discussed in the organization. Still, it can often be reasoned relatively easily as values are often the reason of why certain policies and goals are in place.
Norms - attitude congruence	5	The norms within an organization are generally experienced by every employee and is therefore reasoned to be easily provided.
Financial N-S fit	3	The financial compensation is often job specific and therefore maybe hard to determine on an organizational level. There is however a chance that there is some general compensation for interns.
Travel opportunities N-S fit	3	The extent to which individuals will get to chance to travel or work abroad for their job could be linked to the organization itself as an organization can be international to some extent and can have certain exchange programs in place or regularly work with parties abroad. Still the extent to which someone could qualify for such experiences is somewhat dependent on the kind of position.

Commutability N-S fit	3	The reachability by transport can be easily provided. Whether or not a they are willing to provide a lease car, public transport car, electric bike or allow their employees to work from home more might be dependent on the specific job and therefore might be a bit more time consuming to specify for each opening.
Psychological N-S fit	3	Though it is probably clear to what extent there are systems in place to aid the psychological needs of employees, it might be very difficult to specify the entirety of this effort or to attach a score to the extent to which they provide such services.
Social N-S fit	5	There generally is a good idea of the social events organized in the organization.
Growth opportunities N-S fit	5	It is generally quite clear to what extent there are opportunities to grow within the organization. Still, the extent to which these options are accessible to
KSAs D-A fit	4	Though the required set of KSAs may differ constantly depending on which positions are open within the organization, some skills or study backgrounds can most likely be easily provided for which the organization is looking frequently.
Time D-A fit	5	It should be well known by anyone in the organization that works to recruit people to what extent they are interested in part-time or fulltime internships or jobs.

Table 3: Indicator scores for ease of providing data for the company. The easier it is for the company to provide the data, the higher the score.

Ease for students to provide accurate data on indicator

Used scale:

- 0 = (almost) Impossible to determine.
- 1 = Very unlikely to be known to the student.
- 2 = Unlikely to be known to the student.
- 3 = Could be somewhat known to the student.
- 4 = Likely known to the student.
- 5 = Very likely known to the student

Indicator	Score (0-5)	Reasoning
Personality congruence	4	Though some students have a pretty good idea what their personality is like, some are also not sure. Therefore there might be some difficulties in providing this data. It is reasoned however, that it is a bit more likely that students

		can-, or have figured this out through personality tests or through experiences.
Goal congruence	3	Research shows that most goals students have are education related. Only about half of the students have work related goals (Kvasková et al., 2020). This illustrates that if this data would be provided, it might not be extensively considered.
Value congruence	4	Through working together with other students throughout their studies, students tend to learn a lot about their work related values. And some students are already quite aware on their other values as they already know what is most important to them. It is therefore reasoned that providing data on their personal values will be doable.
Norms- attitude congruence	5	Providing ones attitude on certain instances should not be too difficult to do.
Financial N-S fit	2	Though students might have some idea of what they can expect as salary for a certain job or internship, research shows that salary estimates are not necessarily accurate (Jerrim, 2011). Furthermore, because student life and starting with working life can be chaotic and since the transition of one to the other are financial different in terms of allowances, it can be really difficult to determine for students what their financial needs actually are.
Travel opportunities N-S fit	5	It is assumed that students will have quite a good idea of to what extent they are interested in traveling as they are likely to have done so for their studies or have made the consideration to do so during their studies (Nuffic, 2023).
Commutability N-S fit	5	It will be quite easy to provide information on mobility in terms of what modes of transport are expected to be available and the extent to which they mind traveling for a job or an internship.
Psychological N-S fit	3	It can be hard to identify what psychological needs you have as a student taking on a new position. Still, previous experiences during their studies could give them some idea
Social N-S fit	4	It is reasoned that students have a pretty good idea as to what they would be searching for initially in terms of social events with colleagues as they can compare their student life with the social life they would like to have. Still, it might be hard to determine whether this need will be constant or will increase or decline over time.
Growth opportunities N-S fit	5	It is reasoned that students have a good idea as to what they are looking for in terms of growth opportunities. Both within a company and career opportunities elsewhere.
KSAs D-A fit	5	Though students might not right away be confident in their expertise, skills and abilities, they should have little trouble specifying what they've had to learn or what they are good at.
Time D-A fit	4	It should be easy for students to assess and provide what they are looking for in terms of job type. It might however be somewhat hard for them to make an accurate estimation

		of the time they have available on a weekly basis to spent on a job.
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Table 4: Indicator scores for ease of providing data for the students. The easier it is for students to provide the data, the higher the score.

Level of importance for companies

Used scale:

- 0 = Not relevant.
- 1 = Hardly relevant.
- 2 = Not very relevant.
- 3 = Somewhat relevant.
- 4 = Very relevant.
- 5 = Important.

Indicator	Score (0-5)	Reasoning
Personality congruence	3	Though personality congruence might be beneficial for the atmosphere in the organization and might help colleagues work and communicate more efficiently, focusing on personality congruence in selection might lead to an increasingly homogeneous organization. This could harm creativity and innovation (Schneider, 1987).
Goal congruence	4	It is beneficial for a companies' performance to have their employees be engaged with their goals (Kristof-Brown & Stevens, 2001). This goal congruence might however develop over time so it is not absolutely vital right away.
Value congruence	5	Having employees that share values should be high on the priority list for organizations as it refers to the extent to which employees align with the essence of what the organization does and stands for.
Norms- attitude congruence	4	For an organization, it would be important to avoid internal conflicts among colleagues due to attitudes of individuals that differ from the existing norms within the company. It is therefore reasoned that this will be relatively high on its priority list. Still, because peoples attitudes change according to the norms due to socialization (Checkel, 2017), its importance will be a bit lower.
Financial N-S fit	3	For this specific needs-supplies fit, as well for the following ones it holds that, while it is important for the organization that there exists such a fit, the fit is not based on their needs but rather on those of the individual meaning that it will be lower on their priority list.
Travel opportunities N-S fit	3	Same as the reasoning for financial needs-supplies fit.

Commutability N-S fit	3	Same as the reasoning for financial needs-supplies fit.
Psychological N-S fit	3	Same as the reasoning for financial needs-supplies fit.
Social N-S fit	3	Same as the reasoning for financial needs-supplies fit.
Career opportunities N-S fit	3	Same as the reasoning for financial needs-supplies fit.
KSAs D-A fit	5	Though skills, knowledge and abilities can be developed over time to some extent, an organization is likely to find it important to be able to select people from a certain background.
Time D-A fit	5	It will be important for a company to get someone who is able to commit the required time to do certain tasks that are a part of the job description. It is therefore reasoned that they would find it important to be able to preselect based on this.

Table 5: Indicator scores on level of importance for companies. The more important the indicator is to the companies, the higher the score.

Level of importance for students

Used scale:

- 0 = Not relevant.
- 1 = Hardly relevant.
- 2 = Not very relevant.
- 3 = Somewhat relevant.
- 4 = Very relevant.
- 5 = Important.

Indicator	Score (0-5)	Reasoning
Personality congruence	5	As the congruence of personality is mostly beneficial for the interrelationship between coworkers, and since individuals generally highly value a good working atmosphere (Raziq & Maula-Bakhsh, 2015), it is reasoned that personality congruence is high on the priority list of students.
Goal congruence	3	Though feeling connected to organizational goals can be motivating, it can be more easily obtained and stimulated over time compared to value congruence (Paarlberg & Perry, 2007). It is therefore reasoned that it is lower on the student's priority list.
Value congruence	5	As job satisfaction is significantly related to value congruence (Edwards & Cable, 2009), and since agreeing with the essence of what an organization does makes one identify better with the organization and their role in it (Edwards & Cable, 2009), it is reasoned that value congruence is high on the priority list of the students.

Norms- attitude congruence	3	It would be stimulating for the feeling of fit if one's natural attitudes would fit into the norms of the organization. Still, since individuals tend to adapt to the norms of the organization, it is reasoned that this congruence is a bit lower on the student's priority list.
Financial N-S fit	4	While Salary is one of the primary external factors that students tend to look at when assessing a job opportunity (Purohit, Jayswal & Muduli, 2020), it is hypothesized that most students would rather earn a little less if it would mean that they would have a job they would enjoy more.
Travel opportunities N-S fit	5	The potential fulfillment of travel opportunity needs is identified to be one of the primary factors that students look for when assessing a job opportunity (Purohit, Jayswal & Muduli, 2020), Hence it is high on the student's priority list.
Commutability N-S fit	4	While location is one of the primary external factors that students tend to look at when assessing a job opportunity (Purohit, Jayswal & Muduli, 2020), it is hypothesized that most students would rather commute for a little further if it would mean that they would have a job they would enjoy more.
Psychological N-S fit	3	Though psychological needs should arguably be higher on the student's priority list, it is reasoned that it is not one of the students primary concerns when looking at job opportunities.
Social N-S fit	4	Similarly to personality congruence, being at a place where one's needs for social interaction I met is likely to be highly valued as it stimulates a good working atmosphere which is highly valued (Raziq & Maula-Bakhsh, 2015). Still, since social events can also be initiated by the individual itself it is reasoned to be lower on the student's priority list than personality congruence.
Career opportunities N-S fit	5	Since career opportunities are one of the major factors that undergraduates look at in a job (Purohit, Jayswal & Muduli, 2020), it is reasoned that this should be high on the student's priority list.
KSAs D-A fit	5	Since students tend to search for jobs they feel qualified for in terms of KSAs (Purohit, Jayswal & Muduli, 2020), it is reasoned that this should be high on the student's priority list.
Time D-A fit	5	As it will be important for the student that the company has the right expectations concerning the time they will spend doing a job, it will be important that there is a good time D-A fit.

Table 6: Indicator scores on level of importance for students. The more important the indicator is to the students, the higher the score.

Strength of relationship to organizational attraction

Used scale:

- 0 = Very negatively correlated.
 1 = Negatively correlated.
 2 = Not significantly correlated or Unknown correlation.
 3 = Some evidence of positive correlation but none to strongly support an assumption.
 4 = Positively correlated or evidence to support an assumption of a strong positive correlation.
 5 = Highly positively correlated.

Indicator	Score (0-5)	Reasoning
Personality congruence	5	Personality congruence is shown to be significantly correlated to organizational attraction (Judge & Cable, 1997).
Goal congruence	3	No literature was found investigating the relationship between goal congruence and organizational attraction. However, goal congruence is one of the central attributes adopted in the widely accepted Attraction-Selection-Attraction (ASA) framework (Schneider, 1987b; Schneider et al., 1995).
Value congruence	4	Though value congruence is shown to result in attraction, the relationships are generally small (Edwards & Cable, 2009; Cable & Judge, 1996).
Norms - attitude congruence	2	No literature was found connecting the congruence between the norms within an organization and the attitude of an individual to the level of organizational attraction experienced by the individual. It can however be hypothesized that such a relationship should not be very significant since this congruence is mostly only experienced post hire and are not likely to be formulated during the interview process.
Financial N-S fit	3	The relationship between financial N-S fit and organizational attraction has as far as it is known to us not been explored. The relationship between salary and organizational attraction has been explored however. Still, the existence of this relationship is debated. Salary is both shown to be related (Cable & Judge, 1996; Chi et al., 2018), and shown not to be significantly related to organizational attraction or job attraction (Honeycutt & Rosen, 1997). It would be rather logical to assume that there exists such a positive relationship since, with similar job descriptions and other factors, one would generally prefer the one with the higher salary. Therefore, we will assume a slight positive relationship
Travel opportunities N-S fit	4	There exists evidence of a positive correlation between the given opportunity to travel abroad for work and organizational attraction among students (Terjesen et al., 2007).

Commutability N-S fit	4	While no literature was found linking commutability to organizational attraction, the location of an organization has been shown to contribute significantly to organizational attraction (Turban et al., 1998). Next to that, it has been found that location of a certain job is one of the major characteristics that students look at when searching a job (Purohit, Jayswal & Muduli, 2020). Therefore, it is hypothesized that commutability N-S fit is significantly positively correlated to organizational attraction.
Psychological N-S fit	3	Though no literature was found exploring the specific relation between the extent to which psychological needs of the individual are met by the supplies of the organization, and the organizational attraction, there exists literature that explores the relationship between organizational support and organizational attraction. It was shown that the prospect of having strong organizational support leads to higher organizational attraction (Allen & O'Brien, 2006).
Social N-S fit	4	The anticipation of social links has been shown to be a significant predictor of organizational attraction (Koumbis, 2007). Taking into account what is known about the relationship between needs fulfillment and organizational attraction (Yu, 2014), it can be assumed that the extent to which one's needs for social events is met is most likely to be significant predictor of organizational attraction.
Career opportunities N-S fit	5	It has been shown that potential advancement opportunities are significantly correlated to organizational attraction (Boswell et al., 1993; Turban et al., 1998).
KSAs D-A fit	3	It has been shown that the perceptions of job seekers on their KSAs demand-abilities fit has little effect on the likelihood of them choosing to apply for that job (Cable & Judge, 1996).
Time D-A fit	3	No literature was found investigating the relationship between Time D-A fit and organizational attraction. It has been shown that, given the opportunity to have a flexible time schedule and being able to regulate the time spent on work according to the time it takes to do the job, and being able to regulate that time according to the time available to an individual, that organizational attraction is greater than when this is not the case (Wörtler et al., 2020). Still, this is not direct proof that organizational attraction is positively related to time D-A fit since the increase in organizational attraction could also be due to a feeling of autonomy as a result of being able to schedule your own time. It could however be expected that if an individual knows that they have the time required by the job, that this will result in a higher level of organizational attraction than when they would not have this time.

Table 7: Indicator scores on strength of relationship with organizational attraction. The stronger the relationship, the higher the score.

Strength of relationship to other beneficial outcomes

Used scale:

- 0 = Strongly negatively correlated to several beneficial outcomes.
- 1 = Some evidence of negative correlation or evidence of a weak negative correlation.
- 2 = Not shown to be correlated or unknown correlations.
- 3 = Some evidence of positive correlations or evidence of one or more weak positive correlation.
- 4 = Positively related to one or more beneficial outcomes or strong evidence of multiple positive correlations
- 5 = Strongly positively correlated to one or several beneficial outcomes.

Indicator	Score (0-5)	Reasoning
Personality congruence	5	Personality congruence has been shown to be significantly positively correlated to job satisfaction and organizational commitment, and negatively correlated to intent to quit (Supeli & Creed, 2014).
Goal congruence	5	Goal congruence has been shown to be significantly positively correlated to work attitudes such as job satisfaction, organizational commitment and significantly negatively correlated to intent to quit (Supeli & Creed, 2014). Though the subjective goal congruence has been shown to be the strongest predictor of work outcomes (Supeli & Creed, 2014), the context of this study only allows for an objective assessment of the congruence between goals. In that case, value congruence has been shown to be a stronger predictor for work outcomes (Verquer et al., 2003).
Value congruence	5	Value congruence is showed to be significantly positively correlated to feelings of trust, ease of communication and interpersonal attraction and indirectly to outcomes like job satisfaction, organizational identification and intent to stay (Edwards & Cable, 2009; Supeli & Creed, 2014; Verquer et al., 2003).
Norms- attitude congruence	3	There is little literature to be found that explores the relationship of norms-attitude congruence to beneficial work attitude outcomes. There does however, exist some evidence that the congruence between the norm and ideal norm does predict satisfaction and intent to stay (Arbour et al., 2014).
Financial N-S fit	3	It has been shown that more salary does not result in additional positive work attitudes such as job satisfaction, organizational commitment and retention rate. Not meeting the needs for a certain level of salary however, does result in a significant decrease in work attitudes such as job satisfaction, organizational commitment and retention rate (McLean et al., 1996).

Travel opportunities N-S fit	3	No evidence was found of a positive correlation between the extent to which travel needs are satisfied by an organization and beneficial work attitudes. It was found however that needs-supplies fit is significantly positively correlated to performance, job satisfaction, organizational commitment and retention rates (Kristof-Brown et al., 2005).
Commutability N-S fit	4	Though no literature was found exploring the relationship between commutability and work attitudes, the commuting distance has been shown to be a strong predictor of intent to leave (Steinmetz et al., 2014). Still, since the recent pandemic, the flexibility in the working location has increased significantly (Smite et al., 2022). Therefore, it should be considered that the indicator commutability is not merely about distance and reachability of a location of the organization but rather about the extent to which it is doable to get to a location from where an employee is allowed to work. The availability of flexible work location arrangements have been shown to be significantly positively related to performance, job satisfaction, organizational commitment and retention rate (Chen & Fulmer, 2018; Govender et al., 2018).
Psychological N-S fit	5	Emotional and psychological support from colleagues and supervisors, as well as job security have been shown to be a significant predictor for work attitudes such as job satisfaction, organizational commitment and job retention (Ng & Sorensen, 2008).
Social N-S fit	4	Social and team building activities have been shown to positively influence work attitudes of employees such as job satisfaction and retention rate (Neuman et al., 1989).
Career opportunities N-S fit	5	It has been shown that the extent to one experiences challenge in their work is a significant predictor for display of positive work attitudes such as job satisfaction, organizational commitment and retention rate (Walsh, 2016). Having sufficient growth and career opportunities in place to provide additional challenge is therefore hypothesized to significantly positively influence the display of positive work attitudes.
KSAs D-A fit	5	The demands abilities fit for knowledge, skills and abilities has been shown to be significantly positively related to job satisfaction and organization, and negatively related to intent to quit (Supeli & Creed, 2014). Because this relation has been found to be similar to that of value congruence with these work attitudes, they receive the same score.
Time D-A fit	4	Though no literature was found investigating the relationship between time D-A fit and beneficial work attitudes, there is strong evidence of the positive correlation between D-A fit in general and work attitudes such as job satisfaction, organizational commitment and job retention (Kim et al., 2019). Furthermore, it is to be expected that when an individual can not meet the time requirements for a

		job, they will work overtime or performance will decrease. And it has been shown that working overtime is negatively correlated to job satisfaction.
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Table 8: Indicator scores on strength of relationship with other beneficial outcomes such as job satisfaction and turnover rate. The stronger the relationship, the higher the score.

Measurability

Used scale:

- 0 = No established measures and not realistic to do in a limited set of items.
- 1 = No established measures and very difficult with a limited number of items.
- 2 = Limited established measures and very difficult with a limited number of items.
- 3 = Limited established measures and difficult with a limited number of items.
- 4 = Established measures but difficult with a limited number of items, or limited established measures but very doable with a limited number of items.
- 5 = Many established measures, possible in a limited number of items.

Indicator	Score (0-5)	Reasoning
Personality congruence	5	There are a lot of established measures, most underlying constructs can probably be globally measured in a short set of items (e.g. Iyer et al., 2020)
Goal congruence	4	Though there are some well established measures for goal congruence, the extent to which they are applicable to different industries or a pre-hire context is very limited. So in order to measure the degree of goal congruence, it might be a good idea to set up a set of general goals, on which students and organizations can score to what extent they would find these important to focus on in a similar way as has previously been done by Vancouver et al. (1994) in the context of educational institutions.
Value congruence	5	Value congruence have been well established and should be doable to measure within a limited number of questions. An example of a measure would be the Work Values Survey by Cable and Edwards (2004).
Norms- attitude congruence	4	No established measure was found in literature. Still it should be doable to identify some topics on which there could exist a certain norm such as the formality of clothing, the frequency of informal activities or the formality of contact. The norms within the organizations concerning these topics and the attitudes of the students towards these topics can easily be measured using a few items.
Financial N-S fit	3	There are no established measures to be found for this specific N-S fit. Still, there exist general measures for N-S

		fit although they are necessarily relevant to this context as it is difficult to match on specific needs as they can be very different (Cable & DeRue, 2002). It is doable to measure the extent to which a student finds the salary important but it will be quite difficult to obtain a comparative measure on the company side.
Travel opportunities N-S fit	4	There are no established measures to be found for this specific. Still it should be possible to measure the extent to which it is usual or possible to have opportunities to have business related travel for a company. Similarly it should be doable to measure the extent to which an individual would find this important in a company. This can be done with a limited number of items. The level of fit could both be done through a comparative analysis of the answers with a situation where the needs of the individual are bigger than the supplies of the organization does result in a lower level of fit and the situation where the needs of the student are smaller than the supplies of the individual does not.
Commutability N-S fit	4	No established measures were found going into this specific N-S fit. Still, it should be very doable to assess which options are available to employees living a certain distance from the office (e.g. a business public transport ticket, company car, etc.) Similarly, it should be doable to assess the extensiveness of the commute criteria students have. The level of fit could both be done through a comparative analysis of the answers with a situation where the needs of the individual are bigger than the supplies of the organization does result in a lower level of fit and the situation where the needs of the student are smaller than the supplies of the individual does not.
Psychological N-S fit	3	The Work Values Survey by Cable and Edwards (2004) can be used as a psychological needs-supplies measure (Edwards & Cable, 2009). The items used will not be too extensive.
Social N-S fit	4	No established measures were found going into this specific N-S fit. It would however, be very doable to assess the extent and frequency to which organizations provide different kinds of socialization opportunities. Similarly, it could be measured with the students to what extent they would be interested in these types of socialization opportunities. The level of fit could both be done through a comparative analysis of the answers.
Career opportunities N-S fit	3	No established measures were found going into this specific N-S fit. The extent to which there are opportunities provided by the organization that would allow their students to develop themselves or advance in their career. Similarly, the extent to which students will be interested in this could be measured. The level of fit could both be done through a comparative analysis of the answers with a situation where the needs of the individual are bigger than the supplies of

		the organization does result in a lower level of fit and the situation where the needs of the student are smaller than the supplies of the individual does not.
KSAs D-A fit	4	Similarly to N-S fit, there are some established measures from D-A fit but they are not directly applicable to a pre-hire context (Cable & DeRue, 2002). It should be doable to create a list from the existing study area's to have a list of study backgrounds referring to a certain set of knowledge, skills and abilities. The measurement can then happen through the comparison of the study backgrounds a company is interested in and the study background a student has.
Time D-A fit	4	No established measure of this specific type of D-A fit was found. However, the time D-A fit is really easily measured as you only have to measure the level of similarity between the required hours and the hours one is willing to spend. Or, even more applicable to the context, you could measure check whether the demand for a certain type of opportunity for the company (e.g. part-time/side job, full-time job or graduation internship) is the same as that what the individual is looking for or willing to do) both should not be too extensive to implement.

Table 9: Indicator score on the ease or complexity of measurement. The easier and more accurate the measurement, the higher the score.

Differentiability

Used scale:

- 0 = Not differentiable, all will have the same results
- 1 = Barely differentiable, most will have the same or very similar results
- 2 = A little differentiable, a big portion will have the same or similar results
- 3 = Quite differentiable, some will have the same or similar results
- 4 = Very differentiable, most will have different results
- 5 = Unique, all will have different

Indicator	Score (0-5)	Reasoning
Personality congruence	5	There exist numerous personality tests and taxonomies, one being the 16 personalities. Still, personalities always tend to be too complex to fit in just one category. It is therefore reasoned that personality congruence is highly differentiable.

Goal congruence	4	The goal of the company can differ quite a bit as they are often linked to what a company does. Similarly, the goals of students can differ quite a bit.
Value congruence	3	It can be expected that some of the companies and students will have similar values. Companies often strive to make a positive impact, have a customer oriented way of working and be innovative for instance.
Norms- attitude congruence	3	Though norms and attitudes can differ from company to company and from person to person and can therefore be described in a lot of different ways, the extent to which norms and attitudes can really be considered very different or unique is limited. The reason for this is that there are some norms that flow from the experience from managers and employees who have experience working at another company. Similarly, the attitudes from students will flow from what was accepted during their studies. Therefore some basic similarity is reasoned to be there.
Financial N-S fit	1	Since students are likely to mostly prefer the better paying opportunities over similar ones with lower pay, the differentiability is reasoned to be low. There will be a difference in what students feel like they need but given the chance to do the same job for a better salary, individuals will most likely always choose for the better salary.
Travel opportunities N-S fit	2	The extent to which an individual has the need for work related travel opportunities does differ, they are not expected to differ very significantly. Similarly, an organization has only so many different options for work related travel opportunities they could provide.
Commutability N-S fit	3	There are only so many criteria a student might have for their commute to an employer. Similarly, there are only so many options for organizations to provide supplies such as remote working opportunities, an electric bike, car or public transport card that they could offer employees to satisfy the needs that students might have. But since both parties involved have different options to pick from, the commutability N-S fit is considered to be quite differentiable.
Psychological N-S fit	3	Students are assumed to have some level of similarity in psychological needs due to similarities in what they are used to and what they have experienced. Still the level to which they would value this need being satisfied is expected to be quite differentiable. Similarly, companies are likely to have similar systems in place to fulfill certain needs due to publicly known good case practices. However they will vary somewhat in what kind of psychological needs they focus on satisfying through these systems.
Social N-S fit	3	Similarly to the differentiability of the psychological N-S fit, an individual and an organization have only so many levels to which they can have needs or supply opportunities for social interaction. However, since there multiple kinds

		of social interaction (e.g. informal and formal), the differentiability is considered to be quite good.
Career opportunities N-S fit	2	Since students are likely to mostly prefer the job or internship that would allow them to make larger, easier or quicker steps in their career over a similar one that would not allow them to do so, the differentiability is reasoned to be relatively low.
KSAs D-A fit	4	The level of required knowledge, skills and abilities is likely to be quite different. Still, there are only so many backgrounds a student can have
Time D-A fit	3	There are limited options as to what a student could be looking for and to what an organization is looking for in terms of the type of job. There are however some differences in what organizations may expect from students in terms of time investments or time spent at their location.

Table 10: Indicator score on the ease or complexity of measurement. The easier and more accurate the measurement, the higher the score.

Appendix B: The measures of indicators

In this appendix a list of possible measures is provided for each of the indicators listed in the top four priority tiers in Figure 8.

Personality congruence

The items in Table 11 can be measured using a five point Likert scale ranging from; *Totally disagree* to *Totally agree*.

Trait	Topics (Iyer et al., 2019)	Items students	Items companies
Emotional stability	Flexible	I can easily adapt to new situation.	The majority of the company can easily adapt to new situation.
	Resilient	I am not easily thrown off by a bad development.	The majority of the company is easily thrown off by a bad development.
Extraversion	Exciting	I am easily excited for what I do.	The majority of the company
	Enterprising	I like to take the initiative in a project.	The majority of the company
Openness to experience	Creative	I am creative in problem solving.	The majority of the company
	Pioneering/innovative	I am eager to try something that hasn't been done before.	The majority of the company
Agreeableness	Supportive	I am supportive to others.	The majority of the company
	Pleasant	I like to make people feel at ease.	The majority of the company
Conscientiousness	Achievement oriented	I am result driven.	
	Organized	I am well organized.	

Table 11: The items used to measure personality congruence.

Knowledge skills and abilities demand-abilities fit

The set of items listed in Table 12 are multiple choice questions where only one answer is possible on the student side but multiple could be possible on the side of the company. The fit will be assessed through the comparison of the requirements of the company and the education and education level of the student.

Topics	Items students	Items companies	Options
Study level	Where are you currently educated	What type of students would you be interested in? (multiple answers possible)	<ol style="list-style-type: none"> 1. University (WO) 2. University of Applied Sciences (HBO)

Study progress	What is your current study progress?	What would be your required study progress? (multiple answers possible)	<ol style="list-style-type: none"> 1. First year Bachelor 2. Second year Bachelor 3. Third year Bachelor 4. Obtained Bachelor degree 5. First year Master 6. Second year Master
Study background	What is your primary study program?	From what study program(s) would you be interested in receiving students? (multiple answers possible)	Allow for a drop down with search function of the different available studies.

Table 12: The items used to measure the demands-attributes fit of Knowledge Skills and Abilities or KSAs.

Value congruence

The items in Table 13 will be measured using a 5 point Likert scale ranging from *not important at all* to *very important*.

Core work value (Cable & Edwards, 2004)	Topics	Items Students	Items Company
Altruism	Positive impact on the world	How important is having a positive impact on the world or your community to you?	How important is having a positive impact on the world or your community to your company?
Relationships	Coworker relations	How important is being friends with coworkers to you?	How important are coworker relations to your company?
Pay	Salary	How important is 'earning the big bucks' to you?	How important is salary to your company?
Security	Job security	How important is job security to you?	How important is job security to your company?
Authority	Chain of command	How important is having a clear distinction between boss and peer to you?	How important is having a chain of command to your company?
Prestige	Company reputation	How important is having a good reputation to you?	How important is having a good reputation to your company?
Variety	Task variety	How important is having variety in your working day to you?	How important is having variety in a job to your company?
Autonomy	Job autonomy	How important is being able to make your own decisions about how you perform your job to you?	How important is being able to make your own decisions about how someone performs their job to your company?

Table 13: The items used to measure the value congruence.

Growth opportunities needs-supplies fit

The items in Table 14 will be measured using a 5 point Likert scale ranging from *none at all* to *a lot*.

Topics	Items students	Items companies
Career advancements	To what extent would you want possibilities to take on a higher position at the company (such as getting a permanent job for interns or making promotion)?	To what extent are there possibilities for the student to take on higher positions at the company (such as getting a permanent job for interns or making promotion for hi)?
Trainings	To what extent would you want to use possibilities to receive trainings from the company?	To what extent are there possibilities to receive trainings at the company?

Table 14: The items used to measure the needs-supplies fit for growth opportunities.

Time D-A fit

The items in Table 15 are meant to be multiple choice. The choices are listed in the options columns. On both the side of the student and that of the company multiple answers may be chosen.

Topics	Items students	Options	Items companies	Options
Job type	What are you looking for?	<ol style="list-style-type: none"> 1. A job 2. An internship 3. A bachelor assignment 4. A master assignment 	What type of students do you accept?	Students looking for.. <ol style="list-style-type: none"> 1. A job 2. An internship 3. A bachelor assignment 4. A master assignment
Time investment	How many hours would you look to spend for the company on a weekly bases approximately?	<ol style="list-style-type: none"> 1. < 8 h 2. 8 h 3. 16 h 4. 24 h 5. 32 h 6. 40 h 7. > 40 h 	How many hours would you expect the student to work for your company on a weekly bases approximately?	<ol style="list-style-type: none"> 1. < 8 h 2. 8 h 3. 16 h 4. 24 h 5. 32 h 6. 40 h 7. > 40 h

Table 15: The items used to measure the demands-abilities fit for time.

Social needs-supplies fit

The items in Table 16 will be measured using a 5 point Likert scale ranging from *not at all* to *as often as possible*.

Topics	Items students	Items companies
Informal parties and drinks	To what extent would you be willing to have Friday afternoon drinks with colleagues?	To what extent do you organize informal drinks for colleagues?
Informal activities and outings	To what extent would you be willing to participate in teambuilding activities or fun events with your colleagues?	To what extent do you organize informal company outings and activities?

Table 16: The items used to measure the social needs-supplies fit.