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How Artificial Intelligence May Impact Traditional Recruitment in the War for Talents

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Preface

This master thesis has been written to fulfil the Executive Master of Business Administration at the University of Stavanger. The study reviews how Artificial Intelligence may impact traditional recruiting in the war for talents from the organisational perspective. The motivation for selecting the topic of the thesis is my background as founder and co-founder of several recruitment companies, and special interest in how the recent technology may impact the recruitment industry. Due to my personal interest and as preparation for the thesis, I attended the Oxford Artificial Intelligence[1] programme.

The research was demanding, and a lot of time was spent away from my family, and my greatest gratitude belongs to my family supporting my projects.

I would also like to say thank you to Professor Terje Ingebrigt Vålandal, and the interviewees.

Frank Ween

[1] Oxford Artificial Intelligence programme; A 6-week course overviewing AI.

Summary

The globalisation and the changes in the demographics within the G20 impacts greatly the war for talents. The workforce is subject to a significant cutback due to the aging population, and the globalisation impact of the workforce traveling across nations for employment. The competition for recruiting talents may have shifted from a local to a global perspective, whereas traditional recruitment methods may be insufficient securing a sustainable workforce to the organisations.

The research explores how artificial intelligence (AI) may impact traditional recruitment in the war for talents. To answer the thesis question, we explore the change and the functionality concerning traditional recruitment versus AI hiring applications, the benefits and pitfalls, the competitive advantage, and the impact on recruitment staff.

The study adopted an explorative research and qualitative data collection from semi structured interviews across 13 organisations.

The results showed that the properties of the technology, enable hiring algorithms to target marketing, and search the world wide web by processing big data in the war for talent. The many benefits of using AI in the hiring process may have the opposite effect due to poor datasets and inadequate validation of the algorithms. The pitfalls to using AI technology may raise an ethical concern due to privacy and the lack of transparency in the advanced algorithms. Organisations that fully integrate an AI-centered recruitment system may be able to achieve a competitive or sustained advantage by continuous development and improvement to the platforms, keeping the competitors behind. Due to analyst and psychologist's understanding of the AI involvement in the war for talents, traditional "old school" sales-based recruiters will become obsolete. We conclude that AI may have a superior impact on the traditional recruitment in the war for talents.

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List of abbreviations

AI	Artificial Intelligence
ANN	Artificial Neural Network
E-recruitment	Electronic Recruitment
GDPR	General Data Protection Regulation
HPWP	High Performance Work Practices
IoT	Internet of Things
RBV	Resource Based View

1 Introduction

The purpose of this chapter is to present the background for the thesis, introduce the problem and research questions, delimitations and the layout.

1.1 Background

The ability of the organisation to survive and economic growth in the ever-changing global landscape most likely depends on the capability to attract and retain talent as critical success factors (Beechler & Woodward, 2009; Kane, Palmer, Phillips, & Kiron, 2017). This may imply that the traditional methods to attract and retain talents may not be sufficient anymore as the globalization of the world impacts the war for talents. Talent is argued to be defined as contextual, and as a combination of great abilities, performance, and intrapersonal characteristics (Thunnissen & Arensbergen, 2015). Dries, Cotton, Bagdadli and de Oliveira (2014, p. 23) found less culture dependent factors related to talent. The study revealed ability, skills, and knowledge are potential as common ground, which may imply that competition is more or less universal. Demographics and increased trade across boundaries accelerate the mobility of talents, leading to local competition becoming globalized. In the early days of job searching, you competed with people from similar type of companies in the same geographical areas. Today, everybody is competing against everybody beyond geography and segment (Morgan, 2017). According to a Global Growth Model study by McKinsey, the demographics for G-20[2] have a 3:1 ratio active work force versus retired work force; the prediction for 2025 is 1:1 ratio (McKinsey, 2015). The work force population is indeed shrinking dramatically, and the war for talents is real and present. A survey by PWC indicated that 77% of CEO's predicted the lack of human key competence as the main challenge to their organisations moving forward (PWC, 2017). The term "war for talent" was originally found in a McKinsey report from 23 years ago and argued concerns in the ability to attract skilled talent (Chambers, Foulton, Handfield-Jones, Hankin, & Michaels Ill, 1998). Later on, in the report indicated a shortage in proficient talents; even prior to today's globalization traits and IoT (Internet of Things) era.

[2] G-20; a co-operating forum consisting of 19 countries and the European Union.

IoT is defined as “objects with computing devices in them that are able to connect to each other and exchange data using the internet” (‘THE INTERNET OF THINGS | Meaning in the Cambridge English Dictionary’, n.d.). Globalization and IoT are both a threat and opportunity in the war for talents, depending on the ability to adapt and learn in the new digital age. A study by MIT Sloan Management Review and Deloitte LLP argues, “the ability of companies to attract and retain talent was one of the most serious – and most overlooked – digital threats companies faced” (Kane et al., 2017, p. 17). This may indicate the war for talents is getting even more challenging, and the victory may belong to those that master the art of technology within the most sophisticated recruitment and selection tools available.

1.2 Thesis Statement

Traditional recruitment is often associated with manual and time-consuming processes. Holm’s (2012) case study developed a traditional recruitment model. The model concerns task such as generating a job ad, posting it on selected media and waiting for applicants, Manual screening of resumes and face to face interviews. Lee (2005) argued that traditional recruitment concerns “…long hiring cycle time, high cost per hire, low geographical coverage, and ineffective candidate relationship management” (p. 58). Considering the war for talents, traditional recruitment may seem insufficient in securing talents for the organisation's sustainability and growth. The era of e-recruitment started in the 1990s where joboards and company webpages were the new arena for posting job ads and searching for resumes. However, the phenomena e-recruitment is not definite or a specific methodology. E-recruitment may consist of a wide range of hiring applications, and each hiring application may contain multiple dynamic variables impacting the outcome of the hiring process (Thomas & Ray, 2000). E-recruitment powered by artificial intelligence is the recent technological development within the hiring process, and according to Uphadaway (2018), is a gamechanger within e-recruitment enabling hiring algorithms to continuously crawl the internet searching for the most suitable candidates. Considering the 3,8 billion users of social media (Koetsier, 2020) and AI hiring algorithms we ask the thesis question:

Four research questions have been developed for the exploration of this study.

Research question 1:

How AI may change the traditional recruitment process.

Research question 2:

What is the benefit and pitfalls using AI in the recruitment process.

Research question 3:

Does AI in the recruitment process impact the competitive advantage.

Research question 4:

What is the impact for the recruitment staff using AI in the recruitment process.

1.3 Delimitation

The thesis is delimited to the organisational perspective. The study is delimitated geographically due to the findings. The majority (77%) has its origin in Stavanger and Oslo in Norway, and 23% abroad.

1.4 The Layout

Figure 1 The Layout

The Introduction contains the thesis background, thesis statement and delimitations. The theory section presents the theoretical framework for the research questions. The method presents the methodology for collecting and analysing the data. The purpose of the result

section is to present the responses from the interviewees. The data is presented in a tabular from, and the findings as a subject to the data collection model, is for the purpose of this thesis integrated within the chapter of discussion. The purpose of the discussion section is to analyse the findings and anchor towards the theory within the field subject to discussion and contribution of the research. Then follows the conclusions of the research questions and the thesis question. Finally, we propose the practical implications and future research while also expressing limitations of the thesis.

2 Theory

The purpose of this section is to elaborate the theoretical framework by reviewing relevant literature as a foundation for the research question. The main components cover recruitment in general, recruitment practices, competitive advantage, traditional recruitment, e-recruitment, artificial intelligence and "an architecture for the next generation e-recruitment system".

2.1 Recruitment in General

Recruitment is defined as, "those practices and activities carried on by the organisation with the primary purpose of identifying and attracting potential employees" (Barber, 1998, p.5). However, (Armstrong, 2010, p. 201; Klotz, Veiga, Buckley, & Gavin, 2013) argues that recruitment consist of two phases such as attraction and selection, whereas attraction refers to processes due to attract quality talent, and selection refers to the methods due to select the top talents among the attracted. Recruitment (attraction and selection) offers a wide range of methods, practices, and a complexity due the technology chosen. According to Armstrong, it may be dependent on budget, timeline, and the applications' probability for a positive outcome (Armstrong, 2010, p. 203). Organisations recently tend to see their employees as their most valuable asset, where the economical sustainability often depends on the availability of qualified human resources, thus highlights the importance of an effective recruitment and selection process in the war for talent (Rozario, Venkatraman & Abbas, 2019). Equivalent concerns were raised already in the millennium shift by Taylor and Collins (2000) indicating recruitment as, "…the most critical human resource function for organisational survival and success" (p.1). This was due to the economic growth and the low unemployment rate in 1990´s. The war for talent facing yesterday's challenges effects today´s technology for better or worse. It is most likely worse due to the demographics challenge. Available advanced technology recruitment tools may effectively identify and attract the quality candidates required by the organisations. The recruitment methods and practices used may be perceived by talent as to whether the organisation is attractive or not, and actually decreases organisation's ability to capture talent (Carless, 2006). An organisation that adopts the recent

technologies with the artificial intelligence functions may mirror a high-tech environment with less human touch during the recruitment process, and may be perceived less attractive to candidates as compared to traditional methods. However, Foster, Punjaisri, and Cheng (2010) imply that a positive view about an organisation in general beats the methods concerning the hiring process.

2.2 Competitive Advantage

The war for talent may require a strategic approach to secure the most suitable talents. According to Breaugh and Starke (2000), a strategic approach to recruitment involves a justifiable respond for, "whom to recruit, where to recruit, recruitment sources to use, when to recruit, what message to communicate" (p. 408). One could argue the importance in having a clear picture of whom to recruit, for example, on the basis of skills, personality, competence, and diversity, may carefully decide the strategic path to a successful recruiting process. The strategic approach may initially increase the effort and costs, causing a reasonable question related to the payback by means of increased organisational performance (Mikkelsen & Laudal, 2016b, p. 136). The strategic approach may consider the organisational perspective meaning that recruitment "is a process of soliciting the most talented and motivated applicants, and as such it is a bedrock function" Peters (n.d, p. 98), which implies that an increased organisational performance only may be achieved by enhancing the best and most suitable talents. Further on, the resource-based view (RBV) is commonly used by strategic human resource researchers according to Kaufman (2015), and concerns the ability to achieve a competitive advantage by the company's resources, and argues to be suitable for the organisational view to enhance recruitment impact on the organisation's performance (Taylor & Collins, 2000). Research on recruitment is described by Breaugh and Starke (2000) as "so many studies, so many remaining questions" (p. 405). This quote refers to the ever-growing number of studies with various content within recruitment, and the need to acknowledge the complexity of the process in order to achieve a higher degree of realistic outcome of the research. Taylor and Collins (2000) highlight the concern regarding the lack of

empirical research by investigating the actual link between solely recruitment practices and increased operational performance.

Huselid (1995) found a link between increased operational performance (productivity), and the number of job applicants to the organisation´s open job postings (recruitment intensity). However, increased operational performance is heavily dependent on practices that enhance motivation. One could argue that effective recruitment practices may attract a lot of quality candidates, leading to cost efficiency and positive diversified deliveries of products or service, but require empowering by means of additional motivational practices. Terpstra and Rozell (1993) argued that there was a link between analysing recruitment sources through effective recruitment with the purpose of attracting high skilled people, this resulted in an increased overall performance. The results varied by different industries; there was no evidence found in the financial sector. Collins and Han, (2004) found a link between branding (marketing) of the company, and the number of attracted quality applicants. However, the study revealed that sophisticated recruitment practices did not necessarily have more effect than traditional practices.

Taylor and Collins, (2000) argued that recruitment practices may contribute to a sustained competitive advantage based upon the concept of Barney and Wright, (1998) whereas RBV meeting the concept of VRIO. This may include recruitment practices such as a) Value: value contribution by means of enhancing the labour cost effectiveness. For example, increased recruiting capacity without increased numbers of recruiters[3]. Value contribution may be related to the client satisfaction of the service provided. For example, the ability to recruit diverse candidates. b) Rareness: the ability to recruit unique and rare competence. For example, recruiters understanding the concept of artificial intelligence. c) Imitability: sophisticated and tactical recruitment practices almost impossible to adapt by the competitors. For example, a competitor may be able to copy certain recruitment practices due to technology, however to copy the culture of an empowered recruitment team using the same technology in a superior way tends to be impossible to copy. d) Sustainability: recruitment practice to be kept innovative and a part of a continuously process in order to keep the competitors on a certain distance due to their ability to develop similar practices. For example, design recruitments practices to become best fit

[3] Recruiter; An agent employed to recruit others.

and streamlined for the particular organisation. e) Organisation: Recruitment practices to be aligned with other relevant human resource practices. For example, a mismatch may occur if the recruitment practices appreciate innovative team contribution while the bonus system rewards individual recruiters' quantitative sales achievement.

The proponents of RBV argue that by fulfilling and managing VRIO aspects properly, the resources may become diversified (heterogeneous) and immobile. Achieving heterogeneous and immobile resources, may create imperfect market conditions, and gain sustained competitive advantage (Barney, 1991; Barney & Wright, 1998). According to Kaufmann (2015), the RBV within strategic HRM embraces HPWPs (high performance work practices) versus increased operational performance, meaning that advanced systems for recruitment and selection processes are a part of HRM best practice (HPWPs) (Mikkelsen & Laudal, 2016a, p. 35). The opponents of RBV highlight the causal ambiguity as one of the major flaws in terms of understanding the cause and effect relationship between companies' resources, and the outcome of gaining competitive advantage. This means that the lack of logic keeps management more or less in the dark for whatever actions required to lead towards a competitive advantage (Lado, Boyd, Wright, & Kroll, 2006; Lippman & Rumelt, 1982).Kaufman (2016) highlight "no rules for riches" due to the missing link to the economic market conditions. He argues for an equalization of any higher economical return than similar competitors in the market segment stating: "…that most strategic HRM writers exaggerate the ability of HPWPs to yield competitive advantage" (p. 384). Huselid (1995) anticipated that critics may arise to his findings due to the economic theory that would force the HPWP's gains toward equilibrium. The term "no rules for riches" is defined as "rules that any firm can apply to gain a sustained competitive advantage" (Barney & Clark, 2007).

Further on, critics are concerned recruitment research is too isolated, and does not take into account the many variables within HRM (Orlitzky, 2007). One could argue an effective hiring process may gain quality candidates to meet the criteria in the job description. However, empowerment and contribution to increased operational performance may depend on the various range and combinations of other HRM practices. Barber, (1998) highlights the complexity due to several variables impacting the outcome

and states "…it is often impossible to disentangle the results of individual policies, such as those related to recruitment." (p. 130).
On the basis of the reviewed literature, lack of empirical evidence concerning the bridge between recruitment practices and competitive advantage

2.3 Traditional Recruitment

The beginning of the end for the traditional recruitment practices started in the mid 1990s with the introduction of Internet technology, that changed the rules of the game (Boydell, 2002). Traditional recruitment is often referred to as "face to face" and paper-based recruitment with the traditional media being newspapers and manual job boards[4], as well as meeting people in selected arenas were the main areas for attracting candidates (Chapman & Gødøllei, 2017). According to Lee, (2005), traditional recruitment maybe inadequate by means of "…long hiring cycle time, high cost per hire, low geographical coverage, and ineffective candidate relationship management" (p. 58). Furthermore, Ibrahim and Hassan, (2019) argue a modern approach using artificial intelligence within the hiring process is significantly more efficient than traditional recruitment. One could argue traditional recruitment to be a step-by-step, manual work demanding process. However, traditional recruitment may offer "face to face" and "the human touch" as one of the most valued components. Kapse, Patil and Patil, (2012) confirm the latter and states that traditional recruitment and the modern electronic attributes should be complementary methods in the search for the best talents.
Holm (2012) wrote a case study that developed a model for traditional recruitment. The model consists of four main tasks with its corresponding activities. The first task is performing a job analysis in order to understand the requirements, and to, among other things, generate a job description/specification containing tasks, responsibilities, competence, abilities, and interpersonal skills. Having a clear picture of whom to recruit, the second task is to construct an engaging job announcement to attract the most suitable candidates in traditional media such as magazines, newspapers, radio and TV. The third task is the selection stage, where the applications received are being manually registered.

[4] Job boards; An online service that employers use to advertise jobs.

The paper-based applications are evaluated, and the most interesting candidates are selected for further evaluation. The fourth task is to communicate and inform the applicants by means of formal letter or phone the status about their applications as well as to send rejection notices for those not picked for further evaluation. The fourth task also includes sending an invitation letter concerning the positive pre-selection, and the forthcoming planned activities for further evaluation, such as face to face interviews, pencil and paper-based testing etc… in order to find the most suitable candidate to hire. Holm's (2012) model inherent the external recruitment perspective. External recruitment happens when an organisation is looking beyond their own organisation for recruiting people. It might be that the organisation does not have any internal resources available or that it is a conscious action in order to strengthen the organisation with new skills and capabilities (Mikkelsen & Laudal, 2016b, p. 139).

Traditional recruitment actually used the advantage of computers. However early software (communication protocols) constraints in sharing of data did not allow to gain advantages, neither quantity nor quality, related to the hiring process (Lee, 2005)

2.4 E-recruitment

E-recruitment (electronic recruitment) synonyms may be online recruitment, internet recruitment, and occurs in a wide range of terms. E-recruitment contains several components rather than a specific technique and there are multiple ways and opportunities in the use of its applications (Thomas & Ray, 2000). According to Cappeli, (2001) the ability to win the war for talents belongs to those organisations with superior competence and capabilities within the field of on-line recruitment. Artificial Intelligence (AI) technology is disrupting e-recruitment, and concerns crawling the World Wide Web, and containing the ability to process massive volumes of data in the search for the most suitable candidates (Uphadaway, 2018). Cambridge dictionary defines e-recruitment as internet based exercises for the purpose of matching job applicants and employers ('E-RECRUITMENT | Meaning in the Cambridge English Dictionary', n.d.). Chapman & Gødøllei, (2017) defined e-recruitment as "the use of communication technologies, such

as websites and social media, to find and attract potential job applicants, to keep them interested in the organisation during the selection processes, and to influence their job choice decisions" (p. 216). One could argue that the aforementioned definition inherent sophisticated attributes requiring advanced AI-technology incorporated in the e-recruitment applications, and implies AI-technologies adoption within the e-recruitment industry is emerging.

Some of most common basis components to an e-recruiting system may be online job boards and company webpage in a varying degree of technology complexity and attributes. In the survey Jobvite (2019), the respondents ranked job boards and employer career sites[5] as the most attractive when applying for jobs.

Traditional manual job boards were more or less outcompeted in the 1990s. The "on-line" job boards rapidly became a superior competitor by means of the effectiveness and lower cost. Job boards effectiveness in placing job ads and opportunity to edit whenever needed, and the multiple choice by segment, area, job title etc., made tremendous opportunities for both job applicants and employers compared to the traditional way (Maurer & Liu, 2007).

Company webpage success depends on the organisation's ability to attract people to the site and as well as the design and functionality. Low cost and full control of the content of the site might be a competitive advantage (Thomas & Ray, 2000). Parry and Tyson, (2008) argued that the efficiency in a company's webpage was dependent on whether the company was big and well known in order to attract more visitors compared to smaller and not so well known companies. A modern approach for a well-developed company webpage may be referred to as "employer career site" or "corporate career web site". Lee (2007) argued that a sophisticated employer career site might gain competitive advantage due to cost effectiveness, and the opportunity to influence candidates and their decisions due to targeted information including: diversity, culture, career program, among others. However, Lee acknowledged developing a sophisticated employer career site might not be suitable for all organisations due to the high cost impact. E-recruitment develops due to the technological advancement, and one of the most important abilities, the tailored/targeting of the social media's 3,8 billion users and increasing (Koetsier, 2020).

[5] Employer career sites; A website dealing with employment or careers.

Lee's (2005) analysis of e-recruitment practices of Fortune 100 companies proposed five levels of e-recruitment advancement due technology and automation.

Level 1 (Information Delivery) is the most simplified stage whereas the main functionality is placing job postings and other contact information on the company webpage or external job boards. Level 2 (Search Engine) is about pulling the aforementioned information. The applicants may take the advantage of the interactive search attributes to pull information concerning the available job openings. Some examples include, searches related to assignment category, location of workplace, competence and experience required or a keyword search for an efficient exploration. The company representative or recruiter has similar opportunities in pulling data from candidates with the purpose of candidate profiling to match certain criteria such as pulling data from CVs, forms, questionnaires, or effective keyboard searches. Level 3 (Search Agent) is about pushing information. The principle is more or less the same only opposite compared to the search engine. The applicants may define work related criteria they are interested in, such as work location, freelance assignment, detail and design category and discipline category to be fed in the search agent. The search agent will start to search for the pre-defined criteria and push information to the applicant in pre-defined media channel. The recruiter may streamline information pushed to applicants to keep them interested for future jobs, contributing in building the important pool of candidates. Level 4 (Decision Support) is about narrowing down the volume of applicants due to an increased quality among the candidates that actual apply for the job openings. The applicant will be guided through questionnaires and a various degree of tests by the system like, issues concerning intrapersonal skills, interpersonal skills, education level, culture, etc. The predefined criteria are streamlined by the recruiter and then the system ranks the most suitable candidates in a pre-screening or early selection phase. Level 5 (Holistic) is about an overall e-recruitment system with the purpose of streamlining the process to gain a competitive advantage, and consists of a complexed topology of applications in a two-way communication master -controller network.

Understanding the proposed levels of e-recruitment, Lee (2005) revealed that the majority had not reach level 4 and none in level 5. One could argue that the adoption of e-recruitment's most advanced technologies may integrate in a slower pace than

anticipated, and as argued by Allden and Harris (2013), "…there is a disconnect between the reality and desired state of e-recruitment among businesses…" (p. 44).

E-recruitment has been associated with several benefits compared to traditional recruitment. A study by Parry and Wilson (2009) highlighted that e-recruitment technology might lead to reduced costs and increased efficiency including, reduced administration headcount, increased speed, accuracy, and a wider global reach. Further on, improved customer relations due to efficiency gains of automated task may lead to freeing up time and increased focus on employer branding. The findings are in line with Cappeli (2001), which further highlight the advantages of diversity and an increased pool of candidates. Cappelli (2001) highlights speed as a crucial matter due to approach the candidate in advance the competition with the purpose of securing the candidate in the organisation´s pool of candidates. Further on as argued by Upadhyay and Khandelwal (2018), AI powered e-recruitment increase diversity and quality within the hiring process. The reach for the best candidates may become a two-edged sword as the competitors may use the same advantages to hunt your best employees. Lee (2005) argued for the greater effectiveness and cost savings and that e-recruitment evolved from batch mode to continuous 24/7 mode due to "…anytime-anyplace, ubiquitous system for both jobseekers and recruiters (p. 59)". An exclusive survey by Personnel Today (2009) indicated that 86% of the respondents used e-recruitments by means of cost effectiveness, 91% reported easy to use, 97% expected increase in applicants and 66% in increased diversity However, the respondents reported only 35% increase in quality of applicants and 51% in reduced hiring time (Williams, 2009). A survey by jobs.ac.uk (2013) concerning recruitment trends highlights the top two challenges to be the lack of quality candidates and cost savings. The top two priorities were about reduced cost and reduced hiring time.

Despite the tremendous advantage that e-recruitment may provide, other companies decide to leave e-recruitment and return to traditional recruitment. Chapman and Gødøllei (2017) argues that, on one hand, e-recruitment benefits are volume due to a global 24/7 reach of applicants. On the other hand, the volume may lead to an endless supply of applicants that the organisation may not be capable of addressing. One could argue that this may increase the cost to administrate and may lead to negative employer branding, as

many applicants may not receive a proper feedback in time. Lee (2011) proposed that the main reason for organisation´s abandon e-recruitment were lack of effective e-recruitment applications to manage the vast amount of unqualified applicants. The HR Daily adviser 2017 annual recruiting survey reported that 70,4 % of the respondents highlighted unqualified applicants as the biggest disadvantage of e-recruitment whereas 29,6% reported too many applicants in general as a disadvantage (Davis, 2017). Thomas and Ray (2000) argued that the competitive advantage within e-recruitment will more or less fade away due to the competitors gaining the same advantages. Further on, they argue a competitive advantage may be feasible for organisations inherent an effective holistic recruitment system, and states "Organisations that are most effective in harnessing the technology and managing the information flows will be rewarded with a flexibility and speed that no other recruiting source can match "(p. 51). This in line with Allden and Harris (2013) proposing the requirement of an overall recruitment system to maintain candidate relations in order to gain cost efficiency and attract the quality candidates. Lee (2011) argued in order to gain full advantage of e-recruitment it required as a holistic recruitment system integration covering all aspect of recruitment and its processes. One can argue that single recruitment single applications, for example, (Lee 2005) level 3 (push and pull) application may be less effective without level 4 (decision support) application to moderate the amount of applicants and assist in capturing the quality candidates, and according to Parry and Olivas-Lujan (2011), organisations need to be strategic in approaching e-recruitment in order to gain the advantages it offers.
In traditional programming (expert systems), the outcome is defined, if input = "a", then output = "b". This means that the model is limited to only the known, predefined variables (Kulkarni & Che, 2019). However, AI offers models beyond traditional programming, and as e-recruitment evolves towards AI-platforms, the power and pitfalls of AI require elaboration.

2.5 Artificial Intelligence

Artificial Intelligence (AI) is all around us and impacts our everyday life often without being aware of it, for example, by the use of Facebook[6], LinkedIn[7], Netflix[8] or similar. AI recommender applications suggest books to buy or movie to see predicted on your on-line behaviour (Bjørkeng, 2018, p. 9). Further on, Siri[9] uses advanced AI algorithms in voice recognition to talk to you. Face recognition and recommender systems are heavily used in fighting crime to predict where crime is coming and identification of suspects (Burgess, 2018). AI is the "new building block in the recruitment industry" (Upadhyay & Khandelwal, 2018, p. 255), and the concept of AI requires elaboration to picture the power and pitfalls in how this disrupting technology may be a game changer within recruitment and selection.

Defining AI may, according to Norvig and Russel (2016, p.3), relate to four dimensions such as thinking humanly, acting humanly, thinking rationally, acting rationally. The dimensions refer to the capability of the machine to think and act like humans. AI is by Kaplan and Haenlein (2019) defined as "a system's ability to correctly interpret external data, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation" (p.15). Machine learning (ML) is the core component within AI for the machines to interpret, learn, and predict and may be defined as "learning from and making predictions about data. Developing machine learning usually involves training a program with many examples" (Wooldridge, 2018, p.10). Supervised learning (SL) concerns training a model by means of examples whereas the input and output is known, and as the model learns, it starts also to recognize examples it was not given while training the model (Bjørkeng, 2018, p. 19). For the purpose of AI-recruitment, SL is used in candidate identification (Kulkarni & Che, 2019), and inherent the functionality as level 2 (search engine)(Lee, 2005). Unsupervised learning (USL) differs from SL, thus no training data to guide the model, and may be defined as "Learns

[6] Facebook; A popular social media website.
[7] LinkedIn; A social network used mainly for business.
[8] Netflix; A popular video streaming website.
[9] Siri; Apple´s IOS assistant that responds to voice queries.

patterns in the input even though no explicit feedback is supplied" (Norvig & Russel, 2016, p.694). USL is typically used in recommendation engines and used in level 3 (push and pull) (Lee, 2005) applications for the purpose of AI-recruitment. The last model, Reinforced learning (RL), is a hybrid of SL and USL, and may be explained as a videogame where the rules are explained, but not what to do to actually win the game. Sutton and Barto, (2018) define RL as "when machine learns which behaviour leads to a positive outcome without knowing what actions to take or how to process the data" (p. 1). IBM Deep Blue chess computer may be a proper example of RL whereas the algorithm quickly developed a strategy to beat the world champion in chess (Greenemeier, n.d.).
The latest development within machine learning is deep learning in artificial neural networks (ANN). ANN are used within image and speech recognition and natural language processing (Nielsen, 2015). Norvig and Russel (2016, p.10) argue that ANN process and help machines learn in similar ways that the human brain process information and learn. Deep learning is when the artificial neurons are connected in complexed artificial networks where input neurons learn and adjust themselves by the output neurons (Wooldridge, 2018, p.40).
ANN and deep learning empowered a new era in machine learning, and for the purpose of AI-recruitment, level 4 (Decision support) (Lee, 2005) including push and pull applications saw the day of light and might be considered as a game changer due to the radical implications in the interaction between applicants and employers.
A crucial matter in machine learning is the feed of data to the algorithms to enable learning and make predictions. Algorithms is defined as "a set of mathematical instructions or rules that, especially if given to a computer, will help to calculate an answer to a problem" ('ALGORITHM | Meaning in the Cambridge English Dictionary', n.d.). The Internet creates an endless flow of data in different shapes and formats, and may be referred to as big data. IBM (2020) proposes big data characteristics as high volume, high velocity, and high variety referring to the ever-increasing amount of data, streamed in real time at a big scale in different formats, size and sources. Big data requires advanced analytic tools whereas traditional computing power and methods are out of reach coping with big data (Sutton & Barto, 2018). However, endless amounts of data, sufficient computing power, and suitable machine learning set up will not necessary

gain a successful output. The power of data is within both the quantity and quality, whereas quantity concerns how much data available actually is representative due to characteristics in the population, and quality concerns accuracy and whether the data contains error (Weiers, 2008, p. 7). In other words, if the data material is insufficient, the algorithm will perform poorly. A sufficient machine-learning model empowered with huge amount of quality data may face the complexity barrier as the models getting more and more advanced. The complexity barrier concerns limitation in computing power to solve complex models within an acceptable timeframe (Wooldridge, 2018, p. 20). One could argue as ML and ANN evolves, and the race of the ever accurate model predictions continues; it might compromise the availability of sufficient amount of quality data, and the increasing variables by means of neurons (variables) and neurons layers as may conflict the complexity barrier.

The pitfalls of AI may be referred to as privacy, algorithmic bias, replication, emotional intelligence, and automation of jobs.
Privacy concerns the ownership and third-party use of the digital traces left behind on the world wide web, and may be defined as the rights to keep personal data out of public (‘PRIVACY | Meaning in the Cambridge English Dictionary’, n.d.). GDPR (General Data Protection Regulation) was established to protect the privacy to individuals concerning big data (European Commission, n.d.). Due to the market selling private information in order to track and monitor clients and customers, have become a valuable affair that may jeopardize the privacy concern even more (Madrigal, 2018).

Algorithmic bias occurs when machine-learning algorithms predict an unfair output or discriminate certain groups of people, such error normally originates from bias in the data used to train the algorithm (Urvashi, n.d.). Wooldridge (2018, p.46) argues that algorithms can never be better than the people who make them. Meaning that all humans contain bias in one or the other way. Human bias (conscious or unconscious) incorporated into the algorithm will give poor predictions. For example, when one Googles “CEO´s”, Google Images pop up with 49 images of all white male CEO´s and one image of a female CEO as an example of gender and racial bias (Smith, n.d.).

Replication may be referred to as “the dark secret at the heart of AI” meaning that actually nobody understand nor is able to replicate the predictions of the advanced algorithms due to its complexity (Knight, 2017). For example, when face recognition algorithm classified two African Americans as gorillas (Zhang, n.d.). Amazon recruitment algorithm were shut down when the algorithm kept on discrimination women, and due to replication, they didn´t manage to fix it (Mayer, n.d.). One may argue that the lack of transparency of the algorithm may raise ethical concerns, and as stated, ” …transparent communication is a determining factor in success, guaranteeing commitment and commitment of all in order to advance the company” (Jatoba et al., n.d., p.100). However, in general, the advanced algorithms seems to predict very well, but may be critical for autonomous applications, such as within medical and military that may be troubled to gain trust as a trustworthy system (Hocquet, 2017). However, the benefits of AI may seem significant compared to the risk involved, but precautions and guidelines are required to avoid the pitfalls of AI such as ethical guidelines and verification of algorithm output among more (Pichai, 2018).

Emotional intelligence may be illustrated by the use of face recognition in an applicant video interview, whereas it may not be sufficient to detect micro facial expressions nor level of tone, but rather to understand the context and how to respond in that matter. Emotional intelligence is still superior for humans Brookhouse, (2020), and may be defined as “…a type of social intelligence that involves the ability to monitor one´s own and others’ emotions, to discriminate among them, and to use the information to guide one´s thinking and actions” (Mayer & Salovey, 1993, p. 433). AI may still struggle with perception of situations and emotions when making necessary actions in the heat of the moment. This may be referred to as a weak spot of the technology. However, recent available data containing emotional recognition is increasing meaning that AI emotional machine learning may be in reach in the near future (IdeaKeep, 2018a).

Automation of jobs may be limited by the bottlenecks of automation due to emotional intelligence, and 47% of jobs are most likely to be automated, but the most exposed are the low-skilled routine jobs with less components requiring emotional intelligence,

according to the study by (Frey & Osborne, 2017). Bullhorn (2018) recruitment trend survey revealed 41% of the respondents that automation in the recruitment industry may decrease jobs, but on the contrary, 30% meant it would gain more jobs. One could argue that automation may free up time consuming routine tasks, and concentrate towards emotional intelligence related tasks (Forbes, n.d.). Futhermore, the recruiters most likely require a different set of skills such as intrapersonal and interpersonal abilities (Gratton, n.d.). This implies, for example, routine tasks such as screening and ranking resumes as a task may be lost to automation, and free up time to analysis and interviewing the top five candidates recommended by the AI algorithm. Further on, self-smart and people-smart recruiters may keep the job, but may shift focus towards emotional intelligence tasks. As the technology rapidly advances, whereas AI emotional intelligence dataset are indeed in play, may move the bottlenecks of automation boundaries, and as argued by Wooldwridge, (2018) “While automation initially took the jobs of unskilled labourers, AI will take the ever-more skilled roles” (p. 46).

Grasping the challenges related to AI, may portray the importance in the understanding and competence required by the use of AI technology in order to gain the full advantages. Tesla cars, for example, offers a lot of technology, but it require time and effort to learn and take all the advantages it offers. Autonomous self-driving application may be great advantage, but it may have a crucial result if the limitations of the technology are not known by the driver (CBC, 2020). The aforementioned example was maybe extreme, but it indicates that knowledge and understanding of the AI-tools are of the highest importance. The war for talent is also crucial for companies, organisations and recruiters taking the advantage of the AI technology, require capabilities to understand the pitfalls, the technology, and how to analyse the outcome the models predict (Upadhyay & Khandelwal, 2018). Further on as argued by Mann and O’Neil (2016) hiring algorithms are far from neutral and free from bias.

The powers of AI, the big data characteristics, high volume, high velocity and high variety have been gamechangers in the recruitment industry, due to speed, scale, and automation (IBM, 2020). AI powered tools scan non-stop, both for personal and non-

personal internet sites in the search for the most suitable candidates (Iqbal, 2018). For example, based on candidate's social media profiles and Internet activity to be used to tailor valuable information. Further on as argued by Iqbal (2018), advanced algorithms may persuade passive candidates and contribute to quality candidates. Chatbots or virtual assistants powered by natural language processing may communicate in real time as a personal assistant concerning queries and questions in the application process (Nawaz, 2019). A two-way communication enables the virtual assistant as a candidate relationship builder to keep applicants engaged or as pro-active applicant tracker, making contact to candidates upfront after the application is sent (Upadhyay & Khandelwal, 2018), and predicts the willingness of the candidate to actually change jobs (Almskog, n.d.). Advanced hiring algorithms use voice recognition, face recognition and natural language processing that are integrated in the interview platform to analyse not only the candidate answers, but also micro facial expressions, body language, response time to questions, and voice and tone behaviour (Kulkarni & Che, 2019). An AI powered video interview platform is often used in pre-selection by a trained virtual assistant conducting the interview, and only the candidates passing the pre-set criteria will be invited to the next phase; a face to face interview (Iqbal, 2018). Further on as argued by Ibrahim and Hassan (2019), an advanced video algorithm may contribute increased accuracy and proper selection, and as concluded by Greetha and Bhanu (2018) " AI technology has tremendous impact on recruitment activity as it enables the recruiter to align all unstructured candidate bio-data, construct profile into uniformity, identify and match skill sets required for the industry" (p. 69).

AI algorithms my also assist in detecting skills shortages within the organisation, and avoid unrealistic and bias free job-descriptions (Guenole & Sheri, n.d.). One could argue that poor job descriptions, may be compared to low quality data, and the predictions of quality candidates will fail as the algorithm looks for "wrong candidates". AI algorithms may proactively fight bias, and system may not allow typical bias sources such as gender, age, race, and names in the hiring algorithm (Upadhyay & Khandelwal, 2018). However, as elaborated previously, the implications of both human bias and algorithm bias may propose that AI powered hiring is not sheltered from bias (Ghosh, 2017).

2.6 An Architecture for a Next Generation E-recruitment System

Lee (2007) developed a holistic e-recruitment system, implicit, loaded with AI technology.

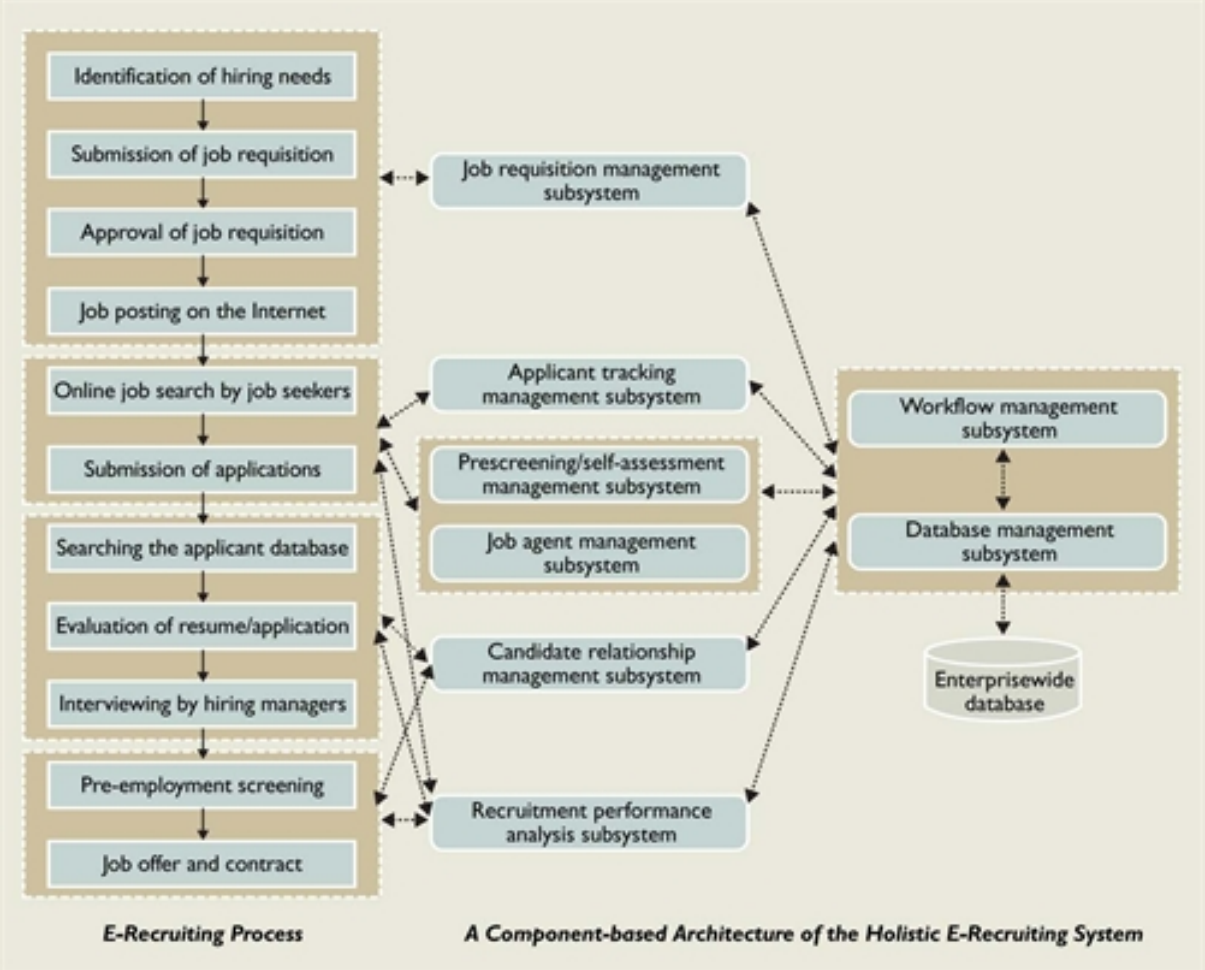

Figure 2 - Holistic Recruitment Model by Lee (2007)

The e-recruitment process, in Lee model (2007), compared to Holm (2012) traditional recruitment process may be argued to be two sides of the same coin due to the main steps presented in the left hand side presented in figure 2, and may not require further elaboration. However, the "subsystems" powering the e-recruitment process may require further explanation. The "Job requisition management subsystem" purpose is to create or assist in creating job descriptions and further make them available at preferred media

channels, such as on job boards and home page career sites. Analysis tools are available due to status of the job openings and the application may be considered level 2. The "Applicant tracking management subsystem" purpose is to pull and share data about the applicants within the topology for further process, whereas the application is considered a search engine (level 2) previously explained. The "Job agent management subsystem" purpose is to "push" data to the applicants and is considered search agent (level 3) previously explained. The "pre-screening/self-assessment management subsystem" purpose is to guide and support both the applicants and the recruiting organisation to make decisions. Through questionnaires and tests, the applicants may mismatch in culture, ethics, or qualifications causing them to leave the status as applicants. For the recruiting organisation, the result of the pre-screening and evaluation of outcomes may result in low ranking of the applicant, and the decision is made to reject the applicant for the particular position. These applications are considered decision support (level 4), previously explained. The "Candidate relationship management subsystem" purpose is to keep the applicant pool interested and close to the organisation by a virtual assistant relationship. This application pushes information to applicants, and is considered level 3. The "Recruitment performance analysis subsystem" purpose is to measure and evaluate the system for continuous improvement. Variables may relate to cost, efficiency, quality, code of conduct, and compliance, bias detection, and is considered a level 4 application. The "Workflow management subsystem" and "Database management subsystem" concern both internal and external communication data transfer and storing of data. These applications allow the network to function as a system and are considered level 5.
The purpose of presenting Lee (2007) "next generation e-recruitment system" and linking it to the subsystems of Lee (2005) level of e-recruitment, is to show that as per today, it is feasible to design a holistic AI powered recruitment system.

As an end to the theoretical framework, a few relevant AI powered application will be presented. IBM Chatbot, Watson Candidate Assistant (WCA), enables a two-way real time interaction with the purpose of personalizing the candidate's experiences with the organisation in solving queries and to guide the prospects from "interested" status to actually become a job applicant. The algorithm proactively scans candidates' resumes

and other targeted channels, and push proposals about jobs and job fit. “IBM gets 7000 resumes per day and surfacing the right candidate in a reasonable time is like finding a needle in a haystack. Since implementing WCA, we have dramatically cut time-to-hire, doubled, and vastly improved the matching of candidates to the jobs.” (Guenole & Sheri, n.d., p. 11).

IBM Watson Recruitment’s (IWR) main purpose is navigating among applicants, and predicting the most suitable candidates. The algorithm takes advantage of the big data and the number of variables it concerns, the possibility for the applicant to actually take the job, the possibility to have success in the job, the possibility to become a great team player and culture fit among more, in addition to have a great match concerning the job description. IWR assists in generating bias free job descriptions, and continuously monitors the hiring process for bias (Guenole & Sheri, n.d.).

HireVue[10] offers AI powered video interview assessments whereas a virtual assistant is interviewing candidates. The algorithm analyses facial expressions, body language, voice and tone attributes, and text analysis, in addition to the actual answer to the queries. The virtual assistant rank the candidates, and only the candidates passing the pre-set criteria will be invited further in the hiring process; a face to face interview with the human decision maker (Feloni, n.d.).

[10] Hirevue; A video interview software and platform.

3 Method

¨The purpose of this section is to demonstrate the methods of collecting and analysing the data material required for this study.

3.1 Data Collection Methodology

This study's purpose is to reveal how artificial intelligence may impact the traditional hiring process in the war for talents. A qualititative method was used involving 13 semi structured interviews from different organisations to collect the required data for the research. The usage of artificial intelligence in the hiring processes is in its infancy, and an explorative methodology conducting interviews in both well established companies historically performed traditional hiring processes, and young technology driven companies representing the modern methods within recruitment, to capture the context and diversity in the transformation. The qualitative approach acknowledges diversity in order to show the researched object in context, and "the qualitative research interview is ideally suited to examine topics in which different level of meaning need to be explored" (Cassell & Symon, 2004, p. 21). The thesis question, as previously characterised, considers the qualitative methodology (interviews) as the most suitable approach to gain in-dept knowledge concerning the topic.

3.2 The Process

The interviews were conducted between March and April 2019. As Covid-19 shut down parts of the world, the interviews were solely conducted via electronic platforms such as Skype and Teams. The initial process concerned searching and identifying relevant literature available for the relatively new concept of artificial intelligence within the hiring process. The purpose was to gain knowledge enabling to identify relevant organisations, and to prepare the structure and content of the interview protocol. Further on, to ensure that the research conducted in this thesis is comparable to previously works for the discussion and recommendations. The principle of method-triangulation concerns coherency in findings by means of multiple data collection methods, and for the purpose

of the thesis, it concerns coherent coherency within theory, articles and interviews (Polit & Beck, 2012, p. 554). The selection of the 13 organisations where based on their experience within both traditional hiring process evolving towards e-recruitment, adoption of artificial intelligence powered applications, and AI-platform driven research and development companies. Further on, the interviewees were selected in both management and operational level to meet the criteria for data source triangulation in order to collect data from a various perspective and validation of the data (Carter, Bryant-Lukosius, DiCenso, & Blythe, n.d.). The interviews were designed to last less than one hour as the interviewing may capture valuable time for the participants, and may be difficult to persuade spending time on a master thesis. The participants were informed about the anonymity and confidentiality, and that the data collected was only for the purpose of this study. Further on, for the purpose of transcription, it was verified and acknowledged by the participants that the recording of the video and audio were accepted and deleted when the study were completed. A signed formal letter was sent by email to the participants to confirm the latter. The intention for anonymity and confidentiality are ethical considerations to protect the interviewees, such that information revealed are not traced back to the source, and create difficulties. It may also gain trust and may improve the willingness to participate and openness that may result in more accurate (honest) data and less error in the data (Coffelt, 2017). The participants are, for the purpose of anonymity, referred to as respondent 1, respondents 2, respondent 3, etc.

13 semi-structured interviews were conducted according to the interview protocol. Semi-structured interviews may seem most appropriate as the level of competence of the interviewees as it allows for a certain structure capturing the literature and previously research, but in addition "…allow the respondents the chance to be experts and to inform the research" (Leech, 2002, p. 668).

	Job Title	Job Function	Interview Time
R-1	Chief Strategy Officer	Development - AI Recruitment Platform	78 Minutes
R-2	Manging Director	Recruitment	81 Minutes
R-3	Vice President	Global Recruitment	67 Minutes
R-4	Manging Director	Development - AI Recruitment Platform	68 Minutes
R-5	Senior Recruiter	Recruitment	55 Minutes
R-6	Senior Recruiter	Recruitment	52 Minutes
R-7	Senior Recruiter	Recruitment	59 Minutes
R-8	Director	Recruitment	74 Minutes
R-9	Director	Recruitment	63 Minutes
R-10	Region Manager	Recruitment	66 Minutes
R-11	CEO	Development AI - Commercial	71 Minutes
R-12	Founder	Development - AI Recruitment Platform	73 Minutes
R-13	Manager	AI Data Analytics & Development	39 Minutes

Table 1 - Summary of the responses from the interviewees

3.3 The Analysis

The thematic analysis (TA) approach is chosen for two reasons. First, it is widely used in qualitative research, and suits a wide variety of research questions Nowell, Norris, White, and Moules (2017), and secondly, the construct of TA may offer a more systematic and accessible adoption within analysis for relatively "early phase" researchers (Braun & Clarke, 2012, p. 58)

The data were transcript and the video recordings were seen several times in order to make notes, and seek to understand the context due the complexity of the technology. The nature of the research question requires both an inductive and deductive TA.

However, the deductive approach is predominating as the properties of the traditional hiring process is central for the parameters subject to the analysis. The explorative nature of AI within the hiring processes required elements of the indictive approach. The coding was impacted on the basis of Holm (2012) traditional recruitment model as the basis of the process where inherent in the questionnaires for the interviews. The reason in that matter concerns the radical implications due to the shift from the traditional sequential methods towards the continuous mode.

The phases of recruitment consist of the attraction phase and selection phase (Armstrong, 2010, p. 201). On the basis of Holm (2012) model, and the purpose of the thesis, it may be reasonably proposed to split the process in four segments due to the interview questionnaires in order to analyse the changes. The changes in AI technology, running in continuous mode, may on the contrary bring a potential integration of the attraction and selection phase in one go, as the AI is based on continuous machine decisions.

The four segments, however, for the questionnaires, as a basis, are attraction, sourcing, screening and interviewing. Attraction concerns activities the organisation perform to attract candidates, for example, generate job description and post the job ads in a job board or company career site etc. Sourcing pertains to activities that are pro-active in searching for candidates, for example, crawling the Internet for suitable candidates. Screening concerns selection activities verifying candidates' competence, capabilities, and personalities among more. Interviewing may be a part of the screening or pre-screening, but for the purpose of this thesis, AI powered video interviewing is central in the evolution of e-recruitment.

The coding was impacted on the main topics in the questionnaire due to multiple measures related to the research question. The main topics concerns validating the theories in the new context covering; the change, the benefits and pitfalls, the competitive advantage, and the impact for the recruiter. However, one may argue that the intention with the proposed model is to identify the correlating data and patterns within elements from the theory, and the maybe most applicable components in a business point of view. The coding was done manually in a spreadsheet for an overview and flexible sorting options, with the purpose of finding relevant information, capture diversity and the links in-between.

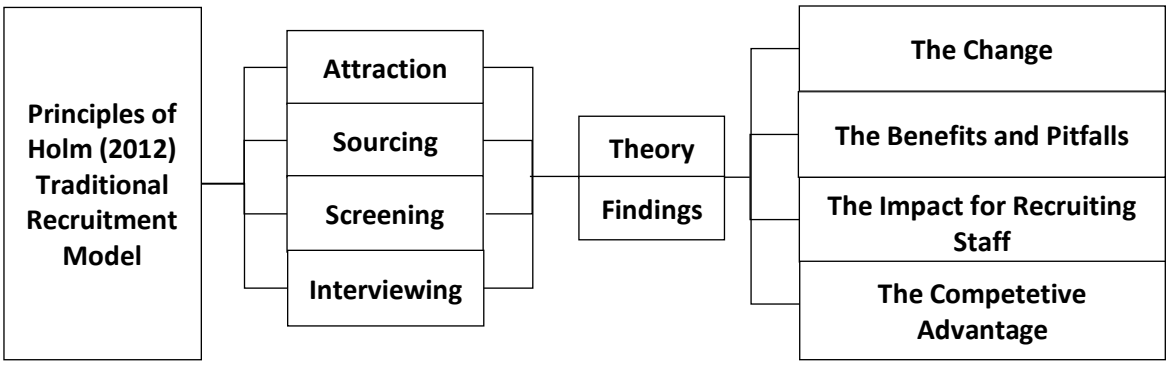

Figure 3 - Data Analysis Model

3.4 The Validity and Reliability

In qualitative research the disadvantages may refer to the human bias and context. One could argue parallel to the emotional intelligence controversy using artificial intelligence in an interview video context. On the one hand, the AI assistant fights bias, but on the other hand, the AI assistant has difficulties reading emotions and context. A thematic approach may contribute significantly by analysing views, trace similar patterns or differences in order to achieve knowledge (Braun & Clarke, 2012, p. 57). The opponents may highlight the lack of quality and integrity due to human bias and implicitly the context. Validity concerns the trustworthiness by means of how research was conducted, and further on whether the data represented what it was intended to represent. For example, if the number of participants is few it may not be representative for the population, or if the participants level of insight for the phenomena is not sufficient, the validity may be low. The reliability refers to whether the studies conducted can be replicated. Meaning whether a similar study will result in similar results (Noble & Smith, 2015). For the purpose of this study, a concern may be raised due to a relatively low number of participants, and in addition the phenomena and technology is relatively new in the context of hiring may infect accuracy in the samples. This may relate to several issues: literature that covers e-recruitment may sometimes lack to specify the underlaying technology and implicit affect the outcome of the applications and experience. Further on, participants' experience varies in use of artificial intelligence within the hiring process, and may yield in overcompensation and human bias. The researcher may set the

context in the overall lines that may affect accuracy in the final results. The validity and reliability may be sufficient as the data showed diversity and coherent links. Further on method triangulation, as previously elaborated, is used to increase the probability for trustworthy results.

4 Results

The purpose of this section is to present the responses from the interviewees. The data is proposed presented in a tabular from, and the findings as a subject to the data collection model, in order to answer to research question, is for the purpose of this thesis integrated within the chapter of discussion.

4.1 The Responses

The respondents are identified as R1-R13, within the proposed phases attached to the main topics.

Attraction	
The Traditional Process	**R1:** By using small data with one person sourcing via emails or Indeed and waiting for candidates to come in. **R2:** Mainly recruiters put up vacancies and wait for responses, not always successful but they are doing it. recruiters are doing real searchers like LinkedIn with skillsets, recruiters are not good at this. If I use LinkedIn the AI of LinkedIn sends very bad matching, the more specialized the vacancies are, the less quality of metrics, Indeed has certain keywords, the AI will send a match based on keywords, but this is also rubbish. 80% sent to me are sales people and not related to keywords. **R3:** It's posting jobs online, not targeted (Only in LinkedIn will target), actively approach people from our database or LinkedIn. 'recruiter Seat' can filter out queries but not really AI, just using a data dump. **R4:** In Norway, not everyone works with brand building or Edper. The first thing we recommend is to take and promote EDPER for their company and build their employees' branding. Something we often ask those we talk to: Do you work with branding? Who decides how this looks? It is the candidates on the outside who decide this? The traditional way is that we do not think so much about this in Norway. More and more people are starting to work on it. **R5:** We help with advertising, posting on social networks and various platforms around in addition to personal contacts, sources, networks and databases. **R6:** We use finn.no early on and to make posts on social media to increase interest to potential applicants. **R7:** It's access to major companies in the market, main customers, and human access. Efficient communication and advertising through Finn or LinkedIn.

	R8: It depends a bit on the assignment. In our company we have a department that works with managers and top managers. In this type of assignment, we work a lot with the specification of the job analysis, which involves were we talk to the board and management. Then we create a working document that is quite comprehensive which is really a mirror image of our requirements specification, which go out with publicly. We then search networks new and established. We also look at sources and environments that are relevant to the assignment. Then, we use the document to attract and motivate potential candidates. Advertising is done on digital media, so that we get a large audience. **R9:** Today we use advertising and we also use targeted advertising in the form of IP advertising that goes on IP addresses, but it is we who define the target group and that's put out ads that will reach the right audience on different platforms. We also work with Linkedin and search. I think we use traditional search. **R10:** What we usually do today is use a combination of networks, contact people we know, and browse previous applicants before we start advertising. As soon as we start advertising, it takes a lot of time—and in our industry, time is important. **R11:** Traditionally, we use staffing agencies. Usually uses network and reputation for business to get people interested. Also uses employees to find candidates, and has a bonus program for it. **R12:** No Experience **R13:** No Experience
The Change of the Hiring Process	**R1:** By using big data instead of small data, we can tie all data together and also gather feedback from 'the funnel'--something you can use for awareness part. The most important thing is investigate what kind of company you have at this moment or what kind you'd like to have. We tie all faces together using AI where the solution of how to raise awareness. Color codes, 2 reds but need more yellow—your awareness creation has to be dedicated to another way of putting ads on line. Have to get feedback loop from even people leaving company. **R2:** If there are CO that do homework and have good tech (deep learning) and the right kind of assessment, they can create an AI to look at the right thing to be able to get decent matching. They must have the right data. AI is being used as sales software, but they have old tech/databases. **R3:** Profiles can be enriched, targeting will be precise (ads) based on more factors, and everything will be in place before personal call, no cold calling. It's all about chat bots. As soon as we will be in touch, they will be ready/interested in a new job. Quality will really increase in the end. **R4:** The job seekers are not actively looking for a new job, but are sitting quietly at their workplace. We know that 80% who have a permanent job can imagine changing jobs if the right opportunity arises. With AI, you can be on the right "sides" that appear. To attract the passive applicants, the other thing we can do is we incorporate our technique into our customers'

	career side. Using AI, we can take care of everyone who has visited the site and send out info, vacancies, etc. to anyone who has shown interest in them as an employer. The primary task is to get an interest for your company. You will be interested in getting the prospect to a job application candidate. You do that by sending out a message, targeted campaign against the position you are in. **R5:** Seems to me that we need to have one set of fixed criteria to find the perfect candidates. It is very important that you put in good quality so that we get the best possible benefit from AI. **R6:** By buying ads on for example, then you can sharpen (location, position experience, etc.) the ad so that you hit the right candidate. AI speeds up processes and keeps personal emotions at bay. **R7:** More incoming traffic than present day, people can see the same ads but with AI companies can be more specific of their target market for the right types of people. Companies can cut out a lot of waste and be more targeted in approach. **R8**: AI can translate a requirements' specification into a set of activities digitally. This ensures that we can reach those we want in a much larger area; both nationally and internationally. Reach out too many, and process a lot of data will be an advantage. Here AI will be a game changer. This is a very demanding process today that costs a lot and a lot of human resources on this. A combination of AI and a project manager can be a game changer. **R9:** I think it will be that we get more help to meet the right candidates. Because we collect more data so we can better target our ads. **R10:** A lot of it is already up in the day in relation to the face, there is an "engine" behind it when we post a targeted ad. A good "engine" will be able to go out to read online and in the financial newspaper and such places to find out where it is good or bad and then direct ads towards these. **R11:** The advantage of AI is that it goes directly to the candidates who are relevant and market the business directly to them. If you have a position or a task to be done then you can use a barometer e.g. face, LinkedIn or the like to advertise your business. Which gives you the opportunity to reach a much larger group and reach higher competence of the candidates. **R12:** What I think is that one now or in the future will use smart solutions to really understand who is the right target group for us, so that we will get some good applicants. That it will involve AI makes a lot of sense to me. You can build profiles and be smart to take things in and place budgets efficiently. **R13**: Insufficient Data
The Benefits of the Change	**R1:** You can use more data, have ads posted online the best way, always assumptions but AI you can get ads tested all day—you get feedback all the time. **R2:** If done right, it will save a lot of time that is used in finding people. The recruiter/consultants can focus more of their time on finding the quality of candidate other than their skillsets—screen more on a personal

	level (important especially in high level jobs). AI cannot be creative and connect all the things together. **R3:** Increases quality of people you will hire and efficiency, less time on people who are not interesting for your company and more time on people you are actually interested in. **R4**: It is about getting a candidate interested in your company. By using AI, you increase the chance that the candidates will come to you. **R5:** Get targeted ads for the right candidates. More subtle presentations. **R6:** Cheaper, and AI can help reach out to those who are not active job seekers. **R7: "**Bespoke approach". Most have assumptions of Co into specific industry; AI can cut through that to get directly to the right people w/o staying behind the brand. **R8:** I think the benefit may be diversity. We are concerned with the values of gender, ethnicity, age, etc. Taking care of these values in a better way than we do today, I think AI can help us with. We will also have the opportunity to reach more people in a shorter time and to screen the candidates in a completely different way. We use video for interviews today. The screening today is done manually, here AI can come in and take over this job. **R9:** It must be better targeting, you hit the right target group. It's faster; you meet the candidates who are relevant. Today, very stomach folds go out in the searches. Which means you get a lot of extra work. **R10:** Less work, it goes faster. Have tried LinkedIn without much luck. People spend more time on e.g. face. **R11**: The advantage is that you reach many more much faster. You can specify info, which is adapted to the individuals. **R12:** The big advantage is that you will get more qualified applicants cheaper. It's as simple as that. **R13:** You have the potential to find the right candidates and more candidates.
The Pitfalls of the Change	**R1:** Ai can form bias, just like people. If your AI learns from your recruitment process through findings of recruiters, then it can be racist or not diverse because it will tie all conclusions to perfect candidate from the assumptions of the recruiter. 1 big pitfall of AI: Bias. **R2:** You teach the AI unconscious biases, if the AI is taught only by white 35 male from California then apply AI in environment like Iceland where culture is different, it will not be matching to environment. **R3:** Increases quality of people you will hire and efficiency, with less time on people who are not interesting for your company and more time on people you are actually interested in. **R4:** The danger of sending out different messages and that the message is incorrect. **R5:** Quality maintenance of the system to get the best possible result. Must also take care of privacy. You collect a lot of personal data to get the best possible benefit from AI.

	R6: Most benefits now in the beginning, then it will become a form of advertising without paying much attention to the message. **R7:** Human contact element, more advertisement/info getting to people in automated way, but human element/touch is very important. Human contact does not need to be completely eliminated. Can companies ensure AI talks to customers in the right way- will be a constant improvement for companies to make. **R8:** I know too little about that. There are stories about if you program incorrectly then you can get e.g. racist a robot. So, we very much depend on that programming and maintenance of AI so that the program sticks to the ethical attitudes we want. **R9:** AI can also learn wrong so that it only hits women in the first recruitment processes and then it gets amplified and you get a skewed distribution because AI has taught itself wrong. **R10**: Shit in shit out. If you do not know the "engine" what to look for, it will not find it. We intended to create a personal profile for online activity. Say that Frank has applied for a position and put it in the "engine" and you will find out negative activities online. Have tested my ladle on my online activity where face thought I was a girl of 24 years. **R11:** It is the "bias" that we return to everywhere. If you do not set up the algorithms and the outcome correctly so that AI performs the right search. It is important to check your own algorithms and make sure you are marketing correctly. **R12:** Maybe it is based on the data that is biased which leads to you getting fewer skilled candidates and being discriminating potentially. **R13:** One thing may be that you are trying to use unconventional data to find a candidate. The data you use this may be unreliable. You end up going against the wrong candidate based on what you were aiming for. You support and generalize too much.
The Impact for Recruiting Staff	**R1:** Short term, receiving/ higher response inmills, work like marketer, look at list you want to reach, tech could reach out to specific people, actively reach out by sourcing. Always have the personal touch in the future. recruiter are doing a lot of not effective work at moment. Can dedicate their work more sophisticatedly. recruiter may be more effective with utilizing AI via touchpoints, phone/email, audience is already engaged with co—they already know about job/co and opening. **R2:** Insufficient Data **R3:** Quality of recruiters will be better; currently you have good sellers who do not know what they are selling. You won't need CV sourcers. recruiter may not be part of the attraction process. **R4:** Gets less to do, He is still the one who has to create text. **R5:** First and foremost, a fantastic aid for the recruiter. Does not take away the job but, makes it easier to carry it out properly. Will also help to make choices without person chemistry. Think AI will be more involved in the process

	R6: Think there will be a need to check more of the content. Regarding the attraction process, AI can take over most of the work, about 85-90 %. **R7**: Can cut through huge amount of day-to-day time get to short lists quicker. AI can give recruiter recruiter more time to take process through. Do less of recruiter and do more of sales element **R8**: The answer is yes. We have left the recruiter. When AI takes over specific tasks in the attraction process, it will automatically delete some of the tasks of the recruiter. So, the need and the division of roles have already changed, but it will happen more and more in the future. Competence for the recruiter will change in the future. **R9:** Thinking that the recruiter can spend its time on slightly different tasks, or other parts of the recruitment process. You're wondering if the recruiter will be redundant? There will be another change in the recruitment industry. Think the recruiter gets a twist in the tasks. Those who have made a living from being a link between companies and candidates face an uncertain future. **R10:** In a perfect world, they will have better time to work more with the other tasks. Often the other processes suffer because you spend too much time searching for candidates. It will give you candidates faster and free up time to make the rest of the process more professional. **R11:** To begin with, there will be a re-prioritization of the work tasks. Will not sit down to call potential candidates. It will be more a follow-up of the algorithms to send out info. to the right candidates. You will be able to do the same job with fewer people. Better follow-up with fewer resources. **R12:** I think it will eliminate a lot of that job. I think you still have to search. Because for some positions it is still worth picking up the phone and calling people still. And that's what you see in marketing and sales. You cannot get away with just Facebook ads somehow. **R13:** It depends on how the job market is and not AI. In this situation that we are in now, it becomes more of an employee market. So, the threat is more from the market than AI.
The Competitive Advantage	**R1:** FB is not allowed to use targeted ads, just 270 settings. We built audience and profile system to not rely on targeting, We built a tool built on profile system to learn every day if we evaluate content that has views on a specific job title, we can get conclusion from Google image recognition and we are not depending on one tier of overview, but we use 100,000 pictures to evaluate for single role. **R2**: Save lots of cost if done well. You can spend a lot of time to your candidate on a personal level, candidate engagement. **R3**: Biggest advantage a big part of work time will be spent on service towards candidate instead of admin task. Pleasing the people being hired instead of CV searching. Work becomes more interesting. Personal touch will make candidates feel better about process. **R4**: Then we go back to what we talked about earlier. If you place an ad on traditional sites, you will not reach all relevant candidates, but if you use our system, we guarantee that you will reach everyone.

	R5: You have the opportunity to sharpen the ads so that you hit the right candidate. Also steers away from prejudice and blinders. **R6:** Pace and accuracy. Reach out to the right candidates first. **R7**: In market like our company, using effective AI gives speed and accuracy, data, and competitive edge (assuming all is correct). Based on us using information and constantly tweaking the system to be efficient **R8**: One of our values is innovation; we want to be perceived as an innovative and innovative company. And that we are the leaders in the attraction process and set our values high through the use of AI will be a game changer against other players. It will also mean an enhanced candidate experience. It will be a completely different accessibility and flexibility. **R9:** It can be an advantage that things go faster. You hit better as long as the AI operates with the right data. **R10:** Again, speed. You wish to increase the candidate's supply. The input is very important to find the right candidate. **R11:** You can advertise that you have it (AI). Only that in it will be something many customers will be interested in. The main point of using AI is to get out into a larger network at an earlier time. You will get more interested people with the right core competence at an earlier stage. **R12:** I think it will give an opportunity to be much more focused, and make it much easier for them to execute on their re-recruitment strategy. So, you can get a lot more that we've talked about before. Have a much more efficiently spent marketing budget on recruitment and "in the end" ends up doing better recruitments. **R13:** It may be an element of cost. At a lower price, if you manage to attract more, it can be a competitive advantage that you manage to attract more candidates.
Sourcing	
The Traditional Hiring Process	**R1:** It's a lot of manual work; looking at CV database, recruiter seeds, LinkedIn, etc. **R2:** Like a brokerage; advertisement, good feeling (emotion) about candidates. Sourcing is from traditional media, job platforms, social media, personal networks, etc. **R3:** You call people interested in a position; it's done manually via phone or Skype. **R4:** Either you hire a recruitment company, head-hunter, or staffing agency, it depends entirely on which candidates you are searching for. **R5:** We use networks, databases, and phone calls. **R6:** By using our own systems and LinkedIn. **R7:** Direct contact with known candidates…company database, LinkedIn, Finn and other platforms. **R8:** When we have a job on the table, then we search for candidates. **R9:** We publish ads for LinkedIn where we apply skills, previous employers and keywords

	R10: The first thing I do is think about the network and see if there is anyone suitable for this job. I call candidates from the network. If I don't have any, then I search LinkedIn, Face, etc. **R11:** Start by checking references to see if the candidate is a good resource. **R12:** There is a lot of LinkedIn recruiting going on where you just do a search and add them to a project and get in touch with them. It's that simple really. **R13:** No Experience
The Change of the Hiring Process	**R1:** Manual work, looking at CV databases recruiter seeds, LinkedIn. Complete feedback loop every process can be influence by it. "Crystal Knows" AI can help find recruitment of people missed in the recruiters, eliminating bias of sourcing process. We have built attracting tool, performance marketing, guide to website for them to apply, build dashboard, reach of campaign, performance marketing, all in this tech, now we just specialize on this. Finally, money is here, this is really important as nurture phase. ATS AI fully automated; set it the way you want to have it. We want nurturing chatbots and assessments. You can get a lot of conclusions out of it. 3 important things in nurturing phase: 1openness to new job (Percentage) 2 Culture fit, 3 skill fit, openness to new job is a score nobody has, but that is main thing as a sourcer. Openness to a new job is most difficult thing. **R2:** Can change matchmaking, quality of candidate, but you must have good assessment and good data. Biggest problem is by definition people manipulate their CVS. Companies also manipulate their vacancies. Done in general. AI could use different data sets to find what real environment people will work in, also assess if somebody is really who they think they are. Could connect more data sets to get better, realistic matches. **R3**: Independent tool is judging on a person rather than human bias, humans are more interested in similar candidates "mini me", AI removes this. Attraction process (AI driven) will be so good candidates will automatically come to you. Quality of sourcing will be better in the end. **R4:** What changes the process is that AI searches automatically. You do not have to go through profiles manually. Our systems retrieve all relevant info on LinkedIn etc. Then we get the candidates automatically on our platforms. You get the candidates who apply but you do not make personal contact. Then you send out the message to the right candidates. Chat is also possible. What AI does if, for example, you are going to have to take in an electrician. Then they can mirror the use of an electrician in another part of the country. **R5:** You have the ability to sharpen the ad so that you hit the right candidate from a larger search area. **R6:** AI is faster and more precise in finding the right candidates. AI only goes after facts.

	R7: AI is more targeted and direct. It is faster, which is crucial for us. Companies with more advanced software have a competitive advantage. The old school way, via telephone and email, is effective but much slower. **R8:** In the lower segment where you will find specific skills, it is possible to completely digitize the process. **R9:** It can be much more automated. I think there are many who work by phone and email to make the first contacts with the candidates. We also use a number of informants during the exploration period. So, there will be more mechanical informants in the future. AI can contribute with open-minded recruitment. This is something very many companies are concerned about. There, AI can have a very big advantage as long as it works properly, that it does not differentiate between gender, ethnicity, etc. **R10:** As it works today, I enter the position in our system, and then I immediately get suggestions for candidates who can fit. So even though I have not advertised the position, I get suggestions from the database (recruitment manager). **R11:** AI will automatically be able to select candidates from the database. The larger the database you have the easier it is for you to pick out a top 5 list of the candidates that suits you best. (If you have entered the right barometer in AI, you can find the candidate with the desired qualifications and personality.) **R12:** I see the very clear variable in sales and marketing. And the systems that are there are a couple of horse heads ahead of what is being recruited. I also think we will see a lot of the same patterns there then, where there is more automated prospecting of potential candidates also email and possibly call sequences that are automated. That is really my hypothesis. **R13:** To a certain extent, we will use LinkedIn, face, etc. because it helps us to get a sense of who these people are.
The Benefit of The Change	**R1:** If you have good AI you can automate a lot of things, the answer to first question, recruiter, with AI it can guide you to do the right things where a human brain can fill in the blanks AI can't. AI can give more diverse candidates. **R2:** Takes out bias, get more information used in decision-making process. Use more data and assessment to analyse more people and working environment of people at the client, Culture fit. **R3**: Increased quality of potential candidates. Effectiveness, speed up process and more predictability (Are people available or not), search other ways to get to people. **R4:** You save a lot of time, reaching a much larger target group. Even those who have not stated what they are working on in social media. So, you search the entire web. **R5:** Better supply, uses more "platforms" You will get better quality have a greater opportunity to tailor. **R6:** Insufficient Info **R7:** It improves efficiency, speed and accuracy. The key for us in our industry is accessing the best possible candidates as soon as possible.

	R8: Volume, geographic area, speed and more targeted advertising. You can screen candidates fast. So, search and screening become one and the same operation. Increases efficiency and shorter process time. **R9:** It must be that it ensures that we have an open-minded recruitment. You meet several potential candidates. **R10:** Advantage, AI is impartial and gets a greater candidate supply. "Bias". The purpose is to find those who are not actively looking. **R11:** The main advantage is that you get a much more optimal selection of candidates as long as you have control over "bias". Then you do not have to process it. **R12:** There is a lot of the same things, but it is often you take away some of the responsibility of a recruiter to actually use all the sources effectively, and actually find candidates and at the same time you do it much faster, more precisely. More effective. **R13:** That you can attract more potential candidates.
The Pitfalls of the Change	**R1:** Same story, also depending on Tech people who are used to it lose criticism, used to doing same things over and over but not looking at 'if its right' filling in all the gaps, maybe more blindsided. **R2**: If AI is not up to par, you will make wrong decisions. People that work with this will be complacent and must be smarter and highly trained. How can Human add value to process, security issues? **R3:** The tooling may not be working properly (too detailed), or people may not be thinking for themselves—letting AI lead. People may find how to manipulate engines. **R4:** The pitfall of using AI is that you do not make direct contact with the candidates. If you are looking for a slightly "heavier position", it is often better to make personal contact. You should do both; keep the candidates warm with social media and then personal contact. Do not save personal data the candidate is only up served via digital tracks. **R5:** Scary that they can pick up all the tracks you leave online, and then form a profile on me. If this is not correct then the errors can be big. Also, privacy. **R6:** Rely too much on the system, so you stop thinking a little yourself. Important with personal contact, feeling. Depending on the job title, AI can be good in production where personal chemistry is not so important. **R7:** There are risks. If the AI set up is not comprehensive then we may not access the correct people. The AI uses data in the CV and if CV's are not populated with specific competencies, AI may overlook candidates based on what it reads. In addition, automated systems can sometimes leave out the personal touch. People buy from people so it is important to find the right blend in order to utilize AI to the fullest. **R8:** It must be: if we have specific requirements specification that AI does not take into account the personal characteristics. Which are important in a leadership position. **R9:** What can be a pitfall is if the AI works with incorrect data or is not maintained. Can't drop AI completely loose.

	R10: Pitfalls may be that you give the system a bad specification, then you get something completely different than what you want. You reach candidates who are not active job seekers. AI can start making its own assessments. Can get too smart for itself. **R11:** If you have poor data than you don´t get the right candidate. It is important to specify what you want and what you are to deliver. This means that you must have a continuous update. It's really the last thing that's the hot thing. Should you have a new resource, but you have not posted that he has been working on it for the last 6 months. Then you make the wrong choice. A typical interlock that one sets up the algorithms that you exclude selections. This is something you have to focus on. Do a lot of testing. **R12:** Privacy. When it is fully automated, you actually reach out automatically or one is invited to process automatically that might happen impersonally and can "miss" good candidates. **R13:** The danger is that you have a little too high of hope for what AI can deliver. You think you're getting a competitive edge that you're not getting. It depends on how you have trained the system.
The Impact for the Recruiting Staff	**R1:** Finally, recruiter will be more like hostess b/c everything is being filled In, someone will need profile of hospitality, welcoming because no need for asking critical questions. Won't be called recruiter, maybe onboarding person to help. **R2:** They will have to focus more on candidates and clients. More sales or candidate focused. A lot of admin tasks can go away as AI will do it. More division of labour with more specialization. A recruiter is someone that does a lot, but will be split up into different positions. Within Sourcing, there will be specialists, not titled recruiters, maybe called sourcers/manager. They need someone who really understands the role of sourcing. **R3**: More effective, more focused on final process of sourcing vs all the admin work. The admin work will be done upfront by AI, they will just need to verify the shortlists. **R4:** With us, you get a control panel where you can see all the traffic on your career pages; see which candidates you have in your candidate stock. The recruiter has the ability to see which pages have the most traffic for relevant candidates and can thereby decide where to place ads, etc. You can easily send out targeted ads to, for example, engineers. **R5:** Recruiter can almost be 100% replaced if the systems work. Must have someone who checks but, the process itself will be controlled by AI. **R6:** Insufficient Info **R7:** A well-built AI system will cut out a lot of the time-consuming work. It should enable a recruiter to get to the best talent in a more efficient manner. It should also improve overall accuracy and quality. The recruiter work load can be greatly reduced. **R8:** For many, AI will be perceived as a threat because they are deprived of tasks that are solved by AI. The recruiter may need to use its expertise

	elsewhere in the process or become more specialized. Our biggest obstacle is our own competence and culture. **R9:** The recruiter is probably more specialized in sourcing process than they are today. They will be more data driven in the recruitment process. The traditional method today is to spread the message as widely as possible. Then to bring in a large number of candidates. It will be a task that will disappear more and more. The task will probably be to market the company as a good place to work instead of specific job advertisements. Recruiter get a whole new role. Recruiter can be present at various events to create dialogue with those who are curious about your company. **R10:** Slightly uncertain, the recruiter will be able to use the time differently in the remaining part of the process. As quality assurance registration of data. You can get a lot for free with an AI based process. The recruiter can do the remaining tasks with higher quality (ref. control, background check). **R11:** There will be talk of a transition period; it will have a limited impact. In the long run, the type of way of recruiting will become outdated. The recruiter's traditional job will disappear. The job is more about software tasks. So, you get a shift from a personal relationship builder to a source, code programmer. **R12:** They are not going to do the "operational" repetitive task of tracking down and adding project roles... **R13:** AI is not going to take over the job of the recruiter. Ai can help the recruiter with div. work tasks.
The Competitive Advantage	**R1:** Getting all conclusions together, if you can tie all positive employees and get conclusion to get sourcing activities, you get a better result/finding. **R2:** Make a better matchmaking to vacancies and faster, until competitors find out how to do it. You need higher skilled people. If you have motivated and trained people you can have huge advantage over companies with less trained, les motivated people. **R3:** Better quality and higher speed, quicker responses. **R4:** What helps you personally is that you do not have to go through the applications / CV personally. You will save a lot of time and resources on using AI. With AI, you have the ability to find the candidates who have exactly the experience you want. The ad only goes to those who have the experience that you request. **R5:** You get a better supply by using more platforms. You will have better quality and a greater opportunity to tailor. **R6:** The recruiter will be able to deliver more and greater accuracy on cver. **R7:** A company with a good AI system will be faster and will present high quality candidates, the sourcing process will be more effective and less time consuming, Time is money in a competitive market and AI offers the key support functions for a recruiter to ensure speed and quality. **R8:** Very similar to the previous answer. Handling large, cost-saving, shorter search time, more targeted and efficient data management.

	R9: Time is always a factor in recruitment. It will be a competitive advantage when the sourcing process goes faster when using AI and the quality of the candidates. **R10:** You can get candidates you would not otherwise get and you can get them faster; AI is impartial. **R11:** For a recruitment company, it will give an advantage in marketing. Candidates may feel headhunted. You do not just want a better portfolio of people in the recruitment company. The company will have a greater appeal. **R12:** You will be able to reach more candidates who are potentially correct then without the use of nearby equal amount of resources. **R13:** You can be more efficient at work and some work tasks can be done faster and more candidates.
Screening	
The Traditional Hiring Process	**R1:** Having a conversation/interview with one phone call, meeting for coffee, maybe one more. You get a feeling/conclusion decision on a fit-based on emotions. Most interviews are based on the first 5 seconds. **R2:** Most companies screening is a lot of CV scanning and recruiters deciding of the candidate is the best fit or not. 60% of it is pushing CVs in hopes they have a hit. **R3:** It's also manual, comb through long list, into short list. **R4:** It depends on which customer and number of applicants. Customers use different services in screening process where you can choose the right candidate automatically. There are many who choose to do this automatically. Different users some think this is good and then you have those who think that personal screening is better than AI. This is an eternal discussion in the industry about which is best. The best is probably a middle ground. Statistics show that AI does a lot better job in the screening process. **R5:** There are several processes in the screening phase, if we go on those who are to be called in for further conversation. Here we use writing where the candidate must elaborate on their competence, which we think is particularly important. This done by phone or in writing. **R6:** Read CVs and connect these to the job descriptions. The job descriptions are very important. **R7:** This is generally done manually. A recruiter will review all applicants with a goal of shortlisting the most relevant candidates. Before shortlisting, the recruiter normally needs to manually review all of the applicants. They will also speak to multiple candidates in order to understand their capabilities and motivations towards the specific job. This is a time-consuming process where the recruiter needs to work with speed whilst also ensuring that candidates are of a good standard before moving them to the shortlist.

	R8: We assess incoming CVs, have video interview with introductory questions linked to a competency profile rooted in the customer. **R9:** They use standard mal for semi conducted interviews. **R10:** Experience-based reading of CV to see if the candidate fits the customer. It's completely manual. **R11:** Led then you throw away all those who do not have the professional skills you need. Then you throw anyone who has not had a job in the last 3 years. Then you are left with 2 – 3 which you are quite happy with. **R12:** Traditionally, it is a lot that one uses screening questions to weed out a good part of the candidates and then you look at the CV to make an assessment of whether it is a current candidate or not. It's really no more complicated than that. **R13:** No Experience
The Change of the Hiring Process	**R1:** Things already discussed, getting history or tracking online information to save time in future. Of course, privacy issues, image recognition can give AI so much help on everything. Biggest hassle for companies. If process could be double as effective, you can imagine how companies will thrive. **R2:** With the right data sets, more intelligent algorithms or tech to assess candidates better, then you can have better judgment about candidate if they are a good fit with client. AI will be huge change in this where you can use a lot of data and analyse it to make a better decision. **R3:** Reduce manual workload, recruiter can focus more on details (psychological part) Focus will be more on personality of person vs screening CV. AI will not be up to these tasks, only content of CV. **R4:** It is that we have AI that sorts out irrelevant candidates automatically. Instead of a recruiter doing this job. Which saves you time and money. You also have the option of adding different filters so that you are not exposed to discrimination. **R5:** You will get a sort of priority list of who will proceed in the process. You have the opportunity to emphasize special competence and desired personality. **R6:** In AI, it is also important to have a good job description. There are many who are not good at reading CVs. By using AI, this will make everyday life easier for recruiters. The problem is that there are so many who write their CVs very differently. Must enter a template for candidates who are desired, then AI will be a great help for the recruiter. Will help with the actual screening but, we still have to read the relevant CVs. The advantage is that we get fewer CVs to read. **R7:** An AI system reduces the amount of time that recruiters use on screening. It offers a more robust system, which reduces the need for slow manual screening. Historically, a person or persons have done screening manually. AI offers a system that doesn't rely on this recruiter support and it can do its job whether the recruiter is present or not. **R8:** I think AI will take over the role of advisor in this phase. I believe the screening phase can be done entirely by AI. Can help us mirror when we

	have large volumes. Today we create a small project group that will deliver at a given time. By using AI, it is possible to cut down on resource use and provide a better candidate experience. Gains both on quality and financially **R9:** Insufficient Data **R10:** Speed, but you have to enter and ensure quality afterwards. **R11:** What is in the screening is that you get a much higher focus on your drawing resource and the choice regarding sourcing. So even if you talk about screening, sourcing appears to be much more in one go. Sourcing and screening becomes more of a task. What we think of as typical sourcing are the 2 -5 candidates that you want to have an interview with, but who will then be able to select data what you want to choose. Then you can choose the different qualities you want to lift into that position. Get a selection so you will get the 2 best candidates. Testing for "bias" one will always have. If you do not do testing, AI will go free. When we talk about discrimination, you have to test. **R12:** Automated screening with automated "assessment" in the form of automated tests early in the process. Automatic video interviews provide a rough sketch of personality traits. People begin to blindly trust data, and right away stop calling for physical interviews based on a fully automated process based on screening questions, tests, and video interviews. Notice of interview and automated booking of interview. It is fully automated until a candidate comes to the door and says "hello". **R13:** Insufficient Data
The Benefit of The Change	**R1:** Everything AI can do is based of conclusions not emotions. Things the human brain cannot do. **R2:** Candidates get a better view of their real profile if you give the right assessments, interviews and scanning of resume, they get to know themselves better (positive) it will save a lot of time in recruitment with a true analysis of candidate. Using AI to make it more personalized for both sides. Especially in screening AI can have biggest difference due to fine-tuning and reducing time. **R3:** Effectiveness in quality. **R4:** As mentioned you are saved time and money. **R5**: Speed and accuracy. Must keep an eye on AI. You can use AI to send rejections to those who do not move on **R6:** The efficiency and that you have a neutral screening of the candidates. **R7:** A huge problem for recruiters is that it is easy to make assumptions about requirements. In many cases, a slight misconception can make a big difference. So, with an AI system, human error and assumptions can be mitigated. The efficiency of an AI system reduces a huge amount of time which recruiters spend reviewing applicants. It builds strong shortlists with high quality. **R8:** As the answer above. **R9:** Insufficient Data

	R10: You can handle larger quantities in less time. Better at choosing the right candidates. Will not give any special advantage directly to the customer, if AI has not learned about the customer. **R11:** As long as you have control over the "bias", it will be able to provide greater diversity. More accurate towards the task. Advantage or disadvantage when using AI disregard certain cver disregard certain features. Look away from age, ethnicity, religion and it helps to increase the sample, but also a risk. You can get a gay man to be proposed to the priest. Not that it's a bad thing. The check afterwards is just as important as before **R12:** A lot of "bias" out and about. Extremely many "random" decisions are made on the completely wrong basis. These are extreme timesaving's. A classic thing I hear from the recruiters is that "I understood 30 seconds into the interview that this was a candidate who was not right". **R13:** It will be time saving. And that you get through all the resumes.
The Pitfalls of the Change	**R1:** If it works for a certain time, you won't look at it critically anymore, must always validate. **R2:** Wrong models will teach AI to use biased things, IQ test/MBTI both are not based on science just statistical methodologies based on set of people and if you are above avg or below—will be based on biases of question. MBTI is more dramatic due to cultural differences. **R3:** Filter out people who may be valuable (Not everyone is the same, people have fallen out of system due to family/cultural background. Their 'school of life' experiences may be a benefit. Discussion of movie The Intern and benefit of older, street-smart guys vs college grads. Discussion of Steve Jobs philosophy of social skills vs tech skills). **R4:** The danger of losing a very good candidate. Not sure the standardized questions manage to single out the best candidates. **R5:** You may end up making the wrong decisions. If you rely too much on AI. If the candidates do not match what is desired. And privacy is important **R6:** The cost; the AI system is expensive. **R7:** One of the risks can be the interpretation. If the AI interprets a need to be something else that what it should be then it is not efficient and may not offer robust screening of a candidate's capabilities. In addition, candidates' interface with the AI may be alien to them and they may feel uncomfortable with the process. **R8:** The danger that a robot can learn itself. The ethical aspects are incredibly important. It is also a pitfall in a screening process to prepare for testing competence / skills and behaviour if an AI is good enough. **R9:** Insufficient Data **R10:** The danger of losing candidates, because AI cannot find candidates for different projects at the same time. AI only works with one position and not the general need of the customer. **R11:** The pitfall is that the testing is not carried out or bad data will lead to you getting the wrong candidates. If you do not have one who checks

	afterwards, the danger is that you may get a negative reputation because you recommend the wrong candidates. **R12:** Not good enough data quality and makes wrong decisions based on bias. A classic example is the Amazon example, where AI began choosing white men who pushed forty as ideal software developers. If you know that it's an AI sitting on the other side, and not a human, you might be able to fool them. The candidate can experience sitting and talking with a computer, you can feel that you are investing a lot of time, and that there is no "reciprocity". **R13:** The danger is if the resumes only hit a few keywords. Then you can quickly miss out on good candidates.
The Impact for the Recruiting Staff	**R1:** If someone is fit for a job, there will be someone—won't be human interaction needed in earlier phases in future. AI can find best-fit vs human, just welcoming to company. AI will ask right questions that human cannot come up with. Recruiter will be out of work in trad setting, 'recruiter has to be really good at making coffee' **R2:** It will help make smarter decisions. Difficult because screening process is fairly complicated, you need specialized. Recruiter will be less successful than someone specialized in AI and knows how to interpret results correctly. It's not good news for recruiter. AI can help with analysis of interview, but interviewer needs to know how to conduct an interview. **R3:** Lower educated recruiters will be out of job, unless trained in technical/AI skills. Easier parts of screening (admin tasks) will be done by AI. Recruiter will need to know the pitfalls of AI. **R4:** This must be up to each and every company. Personally, I think it is becoming more and more AI. AI will do more and more of the actual screening the recruiter will be happy to take a final check. **R5:** Quality-assured AI. The recruiter has been freed up time in the other processes. **R6:** The advantage will be to use AI internally to map any weaknesses. Also use AI as a database for larger organisations of what competencies they have "in-house". Important to teach the recruiter to use the systems. Recruiter is probably important to secure candidates and have the personal contact / chemistry. **R7:** A recruiter will need to work in a different way. The AI system can break down the information, which is time consuming for the recruiter and will offer data that the recruiter will use to move to the new stage. The AI systems goal will be to analyse candidates and provide recommendations, which is normally the recruiter's job. It will mean that the recruiter's focuses will shift. **R8:** Must use expertise and resources in other areas. The recruiter must handle info that comes from AI and be able to utilize the technology. To be a skilled customer even if you have an AI, you must be able to handle the use of AI. So, it's about skill adjustment. **R9:** Insufficient Data

	R10: Is a bit dependent on person. If you do not trust 100% in AI then you have just as much to do. **R11:** Believe that screening and sourcing will be more overlapping tasks. Where the task of the recruiter will be to use more logic. To see that the right candidate is selected. Before that, they found from the almanac to find the candidate. You must check personal data manually so that you can make an assessment that the candidate fits in the work environment described. Makes stronger demands on the recruiter if you use AI than before. **R12:** Concerning volume recruitment the workload will be reduced extremely. You will work with a smaller proportion of the candidates more actively, and this will make you much more precise in the selection. Closer follow-up ... more like a sales pitch. **R13:** AI can be an aid to the recruiter in the screening process. AI can help some of the tasks. Do not think that AI will solve work tasks on its own in the next few years.
The Competitive Advantage	**R1**: My vision is to serve candidates, but tech we deliver for employers. If all tech is serving candidates, then companies will benefit even more. If tech can give honest view of candidates then you get the best fit for employers. If you can have interaction and honestly say what you (job seeker) want, tell honestly what you really like to do, not just dependent on mortgage but what honestly how company can benefit on. CV just says what you know what company wants to hear. Finally, responsibility lays with candidate himself or herself. **R2:** It will bring together much more data, you will need a lot of knowledge of how to do it, and it will be difficult to copy. **R3:** Quality of output will be better compared to trad agencies; speed of process will increase by AI giving quicker response. It may become 1/10 of what it is now. **R4:** You want to make a proper appointment you get into a person who will stay for a long time, which will save the company large sums. Recruitment is difficult even for those who worked with this for a long time. If you find the right "code" that sorts out the right candidate for your company, this will be very valuable. **R5:** Speed and quality assurance. **R6:** Speed and cost. **R7:** It will cut out a lot of time-consuming duties and give a faster path to the end goal of presenting high quality candidates. Competitors who work manually will be slower to reach the best people. AI can help recruiters move through the recruiter process much faster than competitors. **R8:** Important to be perceived as innovative and innovative in the market. Also, a lot about the cost benefit effect. We must be effective and focused. Must deliver added value both for customer to use. **R9:** Insufficient Data

	R10: It can be an advantage in the process if you trust the system. AI gets to take a lot of the hard work. Speed. **R11:** Actually, exactly the same as in sourcing. Each individual will feel headhunted which gives a more personal image towards it. **R12:** More precise selections and save a lot of time. **R13:** Same as last time.
Interviewing	
The Traditional Hiring Process	**R1:** My vision is to serve candidates, but the tech we deliver for employers. If all tech is serving candidates, then companies will benefit even more. If tech can give honest interaction and honestly say what you (job seeker) want, not just your need to pay the mortgage, but how the company can benefit on. The CV just says what you want the company to hear. The responsibility lays with the candidate themselves. **R2:** It's very basic, most companies have the same: 'tell about yourself…' Double check if CV is reliable with what you say, if they are trained, they use 'STAR' methodology to ask certain questions, sometimes use personality assessment. **R3:** It's face to face or phone/Skype, but mainly one on one interviewing. **R4:** The typical process is that you process the applications you have received, sorting them out as relevant, calling appointments for interview 1 sometimes given a 2nd interview. Most often 1 to 1 interview. **R5:** Experienced and structured face-to-face interview techniques where we run a scoring to ensure that 'Mini Me' do not shine through. Has previously created 3 critical and desirable behavioural competencies in cooperation with customer. Where the candidate should score himself in the given areas. Must then justify why that score is set. **R6:** Meet with 80% of candidates face to face and going through standard procedure (talk through CV, references, salary, etc.) **R7:** Insufficient Data **R8:** Competence-based 1st interview where customer and candidate are present. Then they are a testing between 1st and 2nd. interview. Uses these to facilitate the 2nd interview. The second interview often goes a little more in depth. Preferably with work processes simulation of tasks / situations and greater focus on characteristics of behaviour. **R9:** We go between phone, video and in-person interviews. It is based on an interview guide we use; the interviews are semi-structured. It is either recruiter/candidate or manager/candidate **R10:** Interviews take place by phone or face to face. For our part, we have two types of interviews. Asks the same question to all the candidates. Do not consider the answers along the way. Gives grade afterwards. **R11:** I'm a little different than others. In the interview we include the team that the candidate is going to work with out for dinner. Then you get the professional chat with the whole group and the social ones the properties. Whether the candidate fits into the group. **R12:** Traditional face-to-face interviews.

	R13: No Experience
The Change of the Hiring Process	**R1:** A lot of interaction beforehand, same as part of screening, will flow into emotional interpretation of things. Interview will be more like the hospitality role to talk about company, but process before will be automated and completed by AI, just make sure candidate is eager to work for you as a company. **R2:** Using video and AI tech for analytics of what people are saying/how they talk/intonation, interview is one of most important times to connect w/ candidate, so personal touch is key. **R3:** Always have to talk to people face to face/phone, but lots will be filtered out by AI—A bot doing a lot of it up front to give advice to recruiter. Face, voice, text recognition, EQ people will pick up responses and interpret, AI may assist at this. Some may manipulate and 'fake' the AI at these interpretations **R4:** A lot is written about AI so it is possible that people are a little scared to use AI. **R5:** On the personal part will not change, but the clinical parts can AI control. AI takes the mechanical part while people take care of the chemistry, the personality. **R6:** little unsure if there will be any major change. Still want to have face to face. **R7:** The interview process using AI doesn't normally require any human contact. Candidates are asked to provide either text or oral answers to pre-determined questions. It follows a pre-planned line of questioning and makes observations based on the candidates' response. The recruiter, in many cases, will then access the information once the interview is complete. **R8:** 'Cute / eon' is not used in Norway, I think. We want to be far ahead. **R9:** I'm not sure. Cute has launched some video interviews that they use AI on. Where AI should listen to what the candidate says and then evaluate the candidate based on the words used in the interview. H.v they use AI on body language and facial expressions. Which should measure whether people are lying or telling the truth e.g. so there are a lot. Have not tested anything myself. If every bumpy (Tengai) robot that transcribes what is said in the interview, an interviewer sits behind and evaluates. Had questions about the candidate experience the robot looks strange. How did the candidates react? As long as the candidates had received good info in advance, so they got good feedback. Good explanation is important. Will deceive into open-minded interviews. **R10:** I'm not sure because I've never tried that. Feel free to think you can reveal some gossip using AI video. **R11:** You can create fully automatic interviews. You can create personal interviews where you get all the core qualities automatically using AI (eg

	skype) Where to find out if you are introverted, empathetic, etc. You would get whole aspects of a person by using AI. **R12:** Insufficient Data **R13:** The only way I can imagine that AI is going to change the process is that you have to conduct the interviews more like being interviewed. The actual process around not the actual interview. Do not think AI will do anything with the interview itself.
The Benefit of The Change	**R1:** If interview is still part of 'screening—as trad companies' it's good to see what emotions can be recognized, words a candidate can be using, AI can provide "not biased" Can be helpful, as human you just remember things aroused by emotions, not most important things. Help with unconscious bias, you can find exceptions People who are really talented are not being recognized, but AI is based on 'big numbers'. **R2:** It can speed up the entire process, you can focus more on interpersonal connection with people—very important. **R3:** Quality from AI helper, get more info from a person than via trad ways. **R4:** AI analyses only data is not disturbed by personal emotions. If you as an interviewer have a good chemistry with a candidate, there is a danger that you will not make the best professional decision. **R5:** The advantage is that you get objective analyses based only on facts. You get well styled your own data up against AI. **R6:** Will not use AI in the interview phase. Rather use AI to find the right candidate. The candidates want personal contact. The candidate's personality does not appear or you are a little restrained. **R7:** For positions with a high number of applicants, having an AI system will filter through candidates and can initiate a screening interview with the candidate. This saves a lot of time for the recruiter. In theory, an effective AI system is capable of producing a narrowing down a large pool of applicants into a shortlist in a very efficient manner. **R8:** Bias is to treat people equally regardless of gender, age, ethnicity, etc. that one is in fact independent in that way. That's probably the most important part. And how the questions are asked. **R9:** Benefits must be open-minded recruitments. That you are not coloured by subjective assessments. And so, we they probably could handle a lot more info than what a recruiter will manage. Thinking in collaboration AI. **R10:** Often gives you a first impression right away. The tone you get with someone on the way to the interview helps to determine how the interview will be. Then you have often chosen the wrong candidate. Here, AI is impartial. **R11:** Even if you run the interview 1 to 1, the entire interview can be automatic. Algorithm questions are posted in advance. Then AI can make sure that you have been asked all the necessary follow-up questions that you need to form an overall picture of the candidate. **R12:** Insufficient Data

	R13: You can highlight some personality traits based on how people word themselves. Out of the interview afterwards. Will not change anything fundamentally.
The Pitfalls of the Change	**R1:** Insufficient Data **R2:** Tools are not well trained or there is bias in systems, can get false conclusions. Important to maintain personal connection as AI can make mistakes. **R3:** Face recognition, people will understand process behind it and people will learn how to manipulate them (Ex. If you tilt head a certain way it means intelligence, people will start training themselves to tilt that way to fake the machine) A system will be built that matches with 80% of population. **R4:** The pitfall is that AI is unable to read your personality. **R5:** Is that AI takes over too much. Still want human contact. Man is not 100% perfect, as a computer would like. **R6:** It becomes difficult to create a template. Big difference in how e.g. easterners and rogalanders present themselves. The danger is that candidates play a role in influencing AI. **R7:** As with any software applications, glitches in the system can turn a smooth process into a very complicated and frustrating process. AI interviews may feel somewhat impersonal and if a candidate does not understand a question, it may be difficult to clarify what is being asked and understood. **R8:** Insufficient Data **R9:** It could be that it assesses skewed, that it has been trained incorrectly. The candidate experience becomes less personal, will often meet those you are going to work for. There are people who have to work with people. **R10:** It will actually be the other side of the same issue. It's fast becoming too pragmatic and an AI will be black or white. To be able to see the human aspect whether person is nervous or introverted. Such things can be difficult for AI to register. It can be a pitfall. **R11:** The danger is that you trust it completely blindly. That we in the past intrigue full automation without control of "bias". That you use all the aids prematurely without having taken the human aspects with you and bring it back into the algorithm. There are some who feel uncomfortable being recorded on video. People behave differently in interviews than do in a normal setting. In this setting, it is not only the usual "bias" that must be in place, one must also have a "bias" that takes into account that the candidate can change in an interview process. **R12:** Insufficient Data **R13:** You may get the wrong info out of it, and you get a decision basis that is wrong. It may be unfair to the other candidates, to be left out due to some personality traits.

The Impact for the Recruiting Staff	**R1**: If you use tech, the recruiter will be assessed at the same time. Recruiter will be seen if they are right fit for the company as well. Can use Crystal Knows as well? There will no longer be a need for recruiter, just the hospitality. Professions become obsolete. **R2:** They need to be more specialized in interviewing techniques, more related to interpersonal relation vs standard checklist. **R3:** Focused on final stage of total process (Fact checking, double checking, following up on advice from AI to dig in to certain questions). Basic stuff will be done via AI. **R4:** I believe that people who work with hiring and HR will meet people face to face. If an AI is to take over the entire process, a large part of the recruiter's work tasks will disappear. AI can go through a large amount of interviews in a much shorter time. Which will save the company a lot of money. **R5:** The recruiter must use AI as a partner. The recruiter would like to take control as an analysis, data collector. AI will be a support function. **R6:** The requirement for a very strong interviewer will disappear if AI controls the entire interview process. **R7:** The recruiter's job will be a lot lighted with AI involved. There are timesavings in all stages of the interview process including initial contact, booking of interviews and exacting interviews. The recruiter's job is likely to begin at the later part of the process and after the interview has been executed. **R8:** Perhaps more dramatic at this level or in this phase because there is a lot of ownership here, to the extent that AI becomes universal and accessible to very many and the costs are at an affordable level. Then also the competition landscape changed quite significantly and that means that what is the difference between a large heavy player that we are versus a tiny company for example. These are interesting issues. If we do not build competence then I think we will lose a competitive advantage we have today. **R9:** Think the recruiter will still do interviews. Does not get away from the relationship piece. The interview may take a slightly different form. Other focuses e.g. how to build relationships, how to collaborate with others to expectations of management; a little interpersonal stuff. **R10:** Hope it will be as before, but with AI as a support tool because when I interview a person, I always have two other positions in mind. In order not to miss good opportunities, personal assessment is important. **R11:** The recruiter must start relying on new tools, which those who are most conservative are not so willing to do. We need to have forward-thinking personnel who are willing to learn new aids. Who is willing to learn it? The recruiter get fewer interviews, but the interviews it has will have a greater focus on setting up AI. And there will be work afterwards against the "bias" with the information that has come in the interview. So, the workload in that area will be more or less equal, but fewer interviews.

	R12: Insufficient Data **R13:** The best chase is that you get help with certain work tasks. If you have done a good job in the previous processes then I cannot see that AI will take over in this process.
The Competitive Advantage	**R1**: What kind of tone of voice, but the data will be more advantageous to help convince that this person is welcome. Everything else is working smoothly, if the person is in this phase, you must only focus on convincing the candidate in this interview. If other companies don't have this process, you hire people other companies won't get. **R2:** Interview technique, but tools that are AI related in interviewing can be easily replicated and sold. Limited competitive advantage. **R3**: Quality will give completive edge over trad. **R4:** If AI helps you hire the right person in the right place. Then this will save the company a lot of money. We know how much it costs to hire the wrong person. **R5:** Insufficient Data **R6:** Number of right candidates, speed and process. **R7:** AI can offer an efficient and robust process in a very timely manner. In my industry, speed is an essential part of being competitive and getting commitment from the best candidates. AI can give quick feedback to both relevant and irrelevant candidates, saving the recruiter time making individual responses. As well as speed, quality is crucial and AI should be able to ensure a thorough interview process for the candidate that can make them feel that they have had an opportunity to sell their skills to the interview process. **R8:** A bit the same as the previous one. Clear advantage "bias" (ethnicity, gender, age) efficiency and confidence for the candidates that they are treated equally. **R9:** This can show that we are a company that is "first movers" that are concerned with new technology. It does something with our brand. Reduce costs, because processes are carried out faster and less use of human resources. **R10:** Will be able to observe register things that man does not register. Come up with follow-up questions so you have not thought of it yourself. Feel free to have some chess moves. AI is used to make interviews better. **R11:** You get a much more optimized question. So, you save time in the interview process. AI can stop if the wrong thing is answered. It can be difficult for the recruiter to intervene. You get a lot of more streamlined interviews. **R12:** Insufficient Data **R13:** Unsure

Table 1 Summary of the Responses from the Interviewees

5 Discussion

The purpose of this section is to analyse the findings and anchor towards the theory within the field subject to discussion and contribution of the research. The data analysis model is the basis for the discussion. The findings within the main topics concern validating the theories in the new context covering: the change, the benefits and pitfalls, the competitive advantage, the impact for the recruiter. However, the advocated phases based on the principals of Holm (2012) traditional recruitment model may be highlighted when applicable.
One may argue the reason due to the radical impact the artificial intelligence may have on the hiring process whereas the phases, for the purpose of this thesis, attraction, sourcing, screening and interviewing may be processed in parallel rather than sequential.

5.1 The change

5.1.1 The Attraction

It has been argued that the attraction contains the processes and activities due to a organisations strategic decision to find and attract talents to the organisation (Armstrong, 2010). One may assume a variety of sophisticated tools and level of adoption depending on the organisation's recruitment strategy, and argued by Armstrong (2010, p. 203), to build upon the financial and the hiring tools' accuracy in the recruiting of suitable candidates. As argued for the purpose of this study, the attraction is divided within two categories in order to bridge the emerging changes within the hiring process. Category one still concerns attraction of candidates, but a proposed sub category "sourcing" concerns shifting modus from posting ads in order to attract, to proactively searching for candidates. The implication, however, bridging the traditional and the latest technology within the recruitment industry, concerning the AI-powered applications inherent proactively agents performing decision support.

The interviews revealed that the majority of the organisation utilized a combination of

traditional and technology driven methods in the attraction phase. Traditional attraction methods where highlighted as:

> "By using small data with one person sourcing via emails or Indeed and waiting for candidates to come in." (R1)

> "We use finn.no early on and to make posts on social media to increase interest to potential applicants." (R6)

One could argue that traditional approach within attraction is still an important element, in accordance with the principles of Holm (2012) model, but accordingly evolved towards on-line portals. As argued by Maurer and Liu (2007), e-recruitment allowing recruiters to proactively source among various on-line applications by means of keywords, for example, engineering discipline, detail and design experience, specified software skills etc. Proactively sourcing concerning cold calling, database(s) search, network among more, and surprisingly several of the respondents were still sourcing with a low degree of automation.

> "Sourcing is from traditional media, job platforms, social media, personal networks, etc." (R2)

> "Direct contact with known candidates…company database, LinkedIn, Finn and other platforms." (R7)

One may argue the aforementioned sourcing activities to be more or static, and most likely a limited success factor due to functionality and furthermore a common playground for competitors using advanced algorithms searching for similar resources. One may assume a suitable comparison due to the competition adopting advanced technology in the hiring process could be as described by Carrie Altieri VP HR Communication (IBM),

that pre-adoption of advanced AI algorithms concerned searching in the blind for quality candidates (Guenole & Sheri, n.d.).

When reviewing the article to IBM (2020), they argue big data enables high volume, high velocity, high variety, and inherent properties of 24/7 real time streaming of data due to the Internet of things. Big data is not in reach for conventional technology, and require AI powered tools such as ML to process and predict from the models (Sutton & Barto, 2018). One may argue that the technology disrupts the conventional processes, and for the purpose of e-recruitment powered by AI, attracting candidates, may provide a new set of tools inherently sophisticates capabilities. One respondent describes the adoption of AI within e-recruitment:

> "By using big data instead of small data, we can tie all data together and also gather feedback from 'the funnel' something you can use for awareness part. The most important thing is investigating what kind of company you have at this moment or what kind you'd like to have. We tie all faces together using AI where the solution of how to raise awareness. Colour codes, 2 reds but need more yellow—your awareness creation has to be dedicated to another way of putting ads on line. Have to get feedback loop from even people leaving company." (R1)

One may assume that the shift towards advanced technology within the hiring processes are emerging, and among the respondents the data revealed a significant difference within the levels of AI powered tools. An adoption of advanced hiring algorithms may accelerate, due to the competitor's advancement within sophisticated recruitment tool. However as argued by Allden and Harris (2013), "…there is a disconnect between the reality and desired state of e-recruitment among businesses…" (p. 44). This indicates the implementation of sophisticated tools happens much slower than anticipated.

Reviewing the definition by Chapman and Gødøllei (2017) it may be argued that it provides a spot on description in how AI powered applications interact within the recruitment process. It states "The use of communication technologies, such as websites

and social media, to find and attract potential job applicants, to keep them interested in the organisation during the selection processes, and to influence their job decisions" (p. 216). One may argue that the definition covers a wide span of sophisticated hiring tools. For example, chatbots might be considered one of the most important components of technology break through enabling 24/7 availability for both applicants and employer, which disrupts the traditional interface between the parties (Upadhyay & Khandelwal, 2018). Finding and attracting potential candidates concerning algorithms designed to tailor and target ads, and information pitched among the 3,8 billion social media users may be a gamechanger within recruitment (Koetsier, 2020). The most important task may be to convert the most suitable candidates from interested to status job applicants. Lee (2007) argued that a sophisticated company career site provides the opportunity to influence candidates, and their decisions due to targeted information. Some of the respondents acknowledged the advanced use of technology:

> "…We incorporate our technique into our customers career sites. Using AI, we can take care of everyone who have visited the site and send out info. Vacancies etc. to anyone who has shown interest in them as an employer. The primary task is to get an interest for your company. You will be interested in getting the prospect to a job application candidate, and you do that by sending out a message, targeted campaign, against the position you are in." (R4)

> "More incoming traffic…people can see the same ads but with AI the company can be more specific of their target market for the right types of people. Company can cut a lot of waste and be more targeted in approach." (R7)

Upadhyay and Khandelwal (2018) refers to AI as the new foundation within the recruitment industry; it makes sense due to the rapid development from traditional recruitment, via early e-recruitment and the power of AI. As the AI-technology within the hiring process may be considered in its' infancy, the limited user experience may raise a concern due to the pitfalls of AI such as privacy, bias, replication, emotional intelligence and automation of jobs. Norvig and Russel (2016) highlight the machine's ability to think

and act like humans. These concerns may be illustrated by the differences between traditional computer programs and AI algorithms. In a traditional computer program the input and output are pre-defined. In an AI algorithm, the system learns from previous behaviour, adjusts and predicts an outcome. Meaning when a traditional program get an undefined variable it has reached its limitations, but AI is trained to detect and learn from patterns and will generate an undefined variable based on the characteristic of the patterns (Bjørkeng, 2018). Among the respondents, the data revealed a variety of knowledge concerning the pitfalls of AI technology that will be accordingly discussed, and a proper illustrative response in that matter may be proposed by R9:

> "AI can also learn wrong so that it only hits women in the first recruitment processes and then it gets amplified and you get a skewed distribution because AI has taught itself wrong." (R9)

One may argue that E-recruitment covers a wide range of applications, as a system or as individually driven components with the purpose of conducting online recruitment, and offers various approaches in the use of it (Thomas & Ray, 2000). Lee (2005) classification model of e-recruitment contributes in offering a guide in order to identify the different level of e-recruitment tools. The levels are based on the functionality and increasing technological advancement, which may contribute as an indicator and reference within the thesis. Level 1 (Information Delivery) concerns static data, for example, contact information on the company webpage. Level 2 (Search Engine) pertains to the ability to pull data for both applicant and employer, for example, extracting resume data. Several of the interviewees referred to level 2 as a typical sourcing tool used within internal and external data bases; LinkedIn, among others, as highlighted by R2 and R7 previously. One could argue that the level 3 (Search Agent) is where AI really starts to make a difference as the algorithm enables both pull and push information. Among the respondents, the ability to push target information was argued very valuable as previously highlighted by R4 and R7. Level 4 (Decision Support) concerns when the AI actually make decisions for the recruiter, and decides on its' own which candidates are suitable or not for a particular position, and described by a respondent:

> "…Everything will be in place before the personal call, no cold calling. It's all about the chat bots. In the end we will know in an earlier stage than the persons themselves. As soon as we will be in touch, they will be ready/interested in a new job…" (R3)

One could argue that each level of e-recruitment is important, but adoption of a fully holistic system may be a strategic move in the war for talent. Thus, argued by Lee (2005), one may only gain the full advantages of e-recruitment inherits a holistic recruitment system. On the one hand, a holistic system inherent, for example, the property of a search agent (Level 3) to attract huge volumes of suitable candidates, and the properties of a decision support (Level 4) algorithm to narrow down the applicants concerning the top three candidates may gain important advantage as indicated by (Lee, 2005). On the other hand, the pitfalls of AI may have crucial impact even despite considering a holistic system.

5.1.2 The Selection

It has been argued that the selection concerns activities due to pick the most suitable candidates in the pool of attracted talents (Armstrong, 2010). According to Holm (2012) traditional recruitment model, the selection concerns the screening of the received resumes and shortlisting the most relevant candidates. Further on, the pre-selected candidates may be addressed by letter or phone, and invited for further tests and face to face interview. However, those not shortlisted will receive a rejection letter.

The interviews revealed that manual (pre)-screening of resumes are still a common method among the majority of the respondents:

> "This is generally done manually. A recruiter will review all applicants with a goal of shortlisting the most relevant candidates. Before shortlisting, the recruiter normally needs to manually review all of the applicants. They will also speak to multiple candidates in order to understand their capabilities and motivations towards the specific job. This is a time-consuming process where the recruiter needs to work with

> speed whilst also ensuring that candidates are of a good standard before moving them to the shortlist." (R7)

> "Most companies screening is a lot of CV scanning and recruiters deciding of the candidate is the best fit or not. 60% of it is pushing CVs in hopes they have a hit." (R2)

> "Read CVs and connect these to the job descriptions. The job descriptions are very important." (R6)

One may assume that the communication platform is electronic, however a lot of traditional elements inherits time-consuming manual tasks and exposure to human bias elements in the selection (Lee, 2005). As previously argued, the AI powered applications concerns the ability to pull information from resumes, and level 4 (Decision Support) allows the algorithm to analyse and make a decision whether the CV contains targeted information concerning competence, experience etc. It is argued by Frey and Osborne (2017) that low skilled or repetitive tasks are most likely to be automated, and one could assume that screening of resumes and ranking them accordingly is more or less a routine task for a recruiter. One may illustrate the rapid development and availability of sophisticated algorithms; for example, a search engine (Level 2) is based on the same principles as the typical Netflix recommendation engine. Thus, supervised machine learning is commonly used as a search engine (Kulkarni & Che, 2019). The data revealed a few respondents inherent automatic resume screening and ranking of the most suitable candidates:

> "…we have AI that sorts out irrelevant candidates automatically. Instead of a recruiter doing this job. Which saves you time and money. You also have the option of adding on different filters so that you are not exposed to discrimination." (R4)

> "Automated screening with automated "assessment" in the form of automated tests early in the process. Automatic video interviews provide a rough sketch of personality

> traits. People begin to blindly trust data, and right away stop calling for physical interviews based on a fully automated process based on screening questions, tests, video interviews. Notice of interview and automated booking of interview. It is fully automated until a candidate comes to the door and says "hello". (R12)

One may argue that manual screening of resumes will more or less fade away due to the availability of automated screening tools. Furthermore in the war for talents, the numbers of recruiters in your team matters due to headcount cost impact argued by Parry and Wilson (2009), and a proper set up of the hiring algorithm may provide a bias free selection increasing the diversity in your team (Upadhyay & Khandelwal, 2018).

Traditional recruitment concerns face-to-face interviews (Holm, 2012), and the data revealed that several of the respondents conducted, more or less, a traditional face-to-face interview:

> “Interviews take place by phone or face to face. For our part, we have two types of interviews. Asks the same question to all the candidates. Do not consider the answers along the way. Gives grade afterwards.” (R10)

> “Experienced and structured face-to-face interview techniques where we run a scoring to ensure that ‘Mini Me’ do not shine through. Has previously created 3 critical and desirable behavioural competencies in cooperation with customer. Where the candidate should score himself in the given areas. Must then justify why that score is set.” (R5)

> “Meet with 80% of candidates face to face and going through standard procedure (talk through CV, references, salary, etc.).” (R6)

One may highlight AI powered video interviews inherent chatbots and virtual assistant with the ability to communicate in real time, 24/7, between applicant and employer (Nawaz, 2019). Further on, as argued by Kulkarni and Che (2019) these advanced hiring

algorithms use voice recognition to analyse traits in the voice, face recognition to analyse micro expressions and body language, and natural language processing to communicate with the applicants.

An AI powered interview platform may contain the ability to analyse and rank candidates by personal characteristics, and may contain Lee (2005) decision support (level 4) concerning the psychological aspect. Furthermore, one may assume such a sophisticated platform may include other applications proposed by Lee (2005) with the aim to achieving a holistic recruitment system due to a higher degree of automation. The data revealed a difference within the level of automated hiring processes, and only a few respondents reported a high level of automation, and video interview platform:

> "…Complete feedback loops in every process can be influenced by it "Crystal Knows" AI can help find recruitment of people missed in the recruiters, elimination bias of the sourcing phase. We have built attraction tool, performance marketing, guide to website for them to apply, built dashboard, reach of campaign, performance marketing…nurturing phase…ATS is fully automated. We want nurturing chatbots and assessments. You can get a lot of conclusions out of it. 3 important things in nurturing phase: 1 openness to new job (Percentage) 2 Culture fit, 3 skill fit, openness to new job is a score nobody has, but that is main thing as a sourcer. Openness to a new job is most difficult thing." (R1)

> "…Cute[11] has launched some video interviews that they use AI on. Where AI should listen to what the candidate says and then evaluate the candidate based on the words used in the interview…They use AI on body language and facial expressions which should measure whether people are lying or telling the truth e.g. there are a lot…The robot that transcribes what is said in the interview, an interviewer sits behind and evaluates." (R9)

Based on the data analysis, on may argue that AI powered e-recruitment may relate to individual AI-applications, rather than an holistic system, and it may be appropriate to

[11] Cute Recruit; An IT-recruitment company.

anchor towards Lee (2007) holistic recruitment model and subsystems. Subsystems cover: job requisition management subsystem, applicant tracking management system, pre-screening/self-assessment management subsystem, job agent management sub system, candidate relationship management subsystem and recruitment performance analysis subsystem.

Job requisition management subsystem concerns creating a proper job description, and initiating the process of posting the ad. As argued by Guenole and Sheri, (n.d.) it is crucial to generate a proper and precise job description, and if the job description is not sufficient, the algorithm will search and predict low quality candidates, and not the candidates the organisation is looking for. A respondent stated:

> "…It is important to have a good job description…" (R6)

One may argue that having a proper job description to mirror the candidate's match is maybe the most crucial task both in traditional recruitment and e-recruitment. However, e-recruitment powered by AI will amplify the poor job descriptions, and keep on predicting poor candidates. It was quite surprising that none of the respondents highlighted the AI's ability to generate bias free job descriptions. Several respondents, however, highlighted AI's ability to fight bias, and it may be assumed that the researchers were not adequate in the interview concerning this matter.

> " Bias is to treat people equally regardless of gender, age, ethnicity, etc. that one is in fact independent in that way. That's probably the most important part…" (R8)

> "Independent tool is judging on a person rather than human bias, humans are more interested in similar candidates "mini me", AI removes this..." (R3)

> "Take out bias, get more information used in decision-making process. Use more data and assessment to analyse more people and working environment of people…" (R2)

It may be considered that fighting bias is crucial, for example, to achieve equality and a diversified work force. However, as argued by Mann and O'Neil (2016), it may not be achievable to avoid bias within the hiring algorithms. This topic will be further discussed in connection with the pitfalls. Hiring algorithms are far from neutral and free from bias.

Applicant tracking management subsystem may be considered equivalent to Lee (2005) search engine (Level 2), and argued properly discussed, and require no additional discussion.

Pre-screening/self-assessment management subsystem, as agued by Lee (2007) concerns the activities with purpose for both parties, applicants and employers, to get an understanding of the job fit, by means of information, questionnaires, tests among more. One may argue for the applicant that due to interactive communication and results of questionnaires, it may influence whether the organisation is interesting to be a part of or not. For example, the interactive session concerning chatbots and guiding through a variety of questionnaires, may contribute in making the organisation less attractive due to a high degree of automation and less human contact. This may not necessarily be negative for the organisation; on the contrary, one may argue it would be a poor job fit for an organisation exposed to a high degree of automation. For the employer, for example, the algorithm may predict a mismatch due to candidate personality due team-based organisation, and reject the candidate in that matter. Such subsystems as a valuable tool narrowing down, and leave only the best fit candidates for further evaluation by the human recruiter. Carless (2016) argues that recruitment practices may influence in the applicants' interest in the organisation. However, Foster, Punjaisri, and Cheng (2010) argue that the applicant's intertest concerns the branding, and not recruitment methods. The interviewees revealed that some respondents use pre-screening/self-assessment management subsystem tools. The findings did not reveal any specific tool that the applicant proactively executed, for example, forms and online tests. Furthermore, video analysing tools using voice recognition, natural language processing, and face recognition are actively in use by some of the respondents. The findings revealed a "listen in" AI

powered application, referred to as Crystal Knows[12], to assist the recruiter interviewing candidates. Crystal Knows builds a real time psychological profile, based on traits concerning voice and tone. Furthermore, it provides a guide and evaluation concerning the questioning and answering. Meaning the algorithm predicts a personality category for the candidate, and suggests questions preferable for such personality (Crystal, n.d.). Some of the respondents used Crystal Knows within the pre-screening process:

> "…Chatbots and psychological profiling, Crystal Knows…" (R3)

> "…Complete feedback…process can be influenced by it…Crystal Knows…(R1)

Job agent management subsystems may be considered equivalent Lee (2005) to search agent (Level 3), and arguments were properly discussed, and require no additional discussion.

Candidate relationship management subsystems, is argued by Lee (2007) with the purpose of keeping the applicant pool interested. E-recruitment has been criticised for the lack of human touch (Kapse et. al. 2012). Several of the respondents acknowledge the importance of the human contact element, and that AI may contribute in that matter:

> "…keep the candidates warm with social media and then personal contact…" (R4)

> "…Human element/touch is very important…ensure AI talk to customers. Will be a constant improvement…" (R7)

> "…we want nurturing chatbots and assessments…" (R1)

Recruitment performance analysis subsystems, is argued by Lee (2007) to inherent a dashboard analysing, and presenting relevant data concerning key performance indicators. One may argue that e-recruitment is all about analysing data for the purpose of predicting an outcome, the discussion clearly revealed a higher level of data analysis, for

[12] Crystal Knows; a company using Personality AI to analyze a candidate´s personality.

example, number of applicants and interviews, cost per hire among more. Among the respondents, it was only mentioned by R1 "…build dashboard…"and R4 "…Our systems retrieve all relevant information."

5.1.3 The Benefits and Pitfalls

The benefits and pitfalls of using AI within the hiring process may be considered a double-edged sword as the benefits may turn into pitfalls due to the nature of AI, for example, due to poor data feeding the algorithm, and as argued by Upadhyay and Khandelwal (2018) the ability to gain the benefits within AI powered hiring application require proper validation of the performing algorithms.

5.1.3.1 Benefits

Considering the impact of the big data characteristics, and the property of advanced machine learning, algorithms enabling target ads to proactively identify and influence pre-defined candidates may be argued as one of the most important benefits of AI powered e-recruitment (Lee, 2005). For the purpose of attracting candidates, the data showed the ability to tailor/target ads was considered an important benefit.

> "…The advantage of AI is that it goes directly to the candidates who are relevant, and market the business directly to them. If you have a position or task to be done then you can use a barometer e.g. Face, LinkedIn or the like, to advertise your business. Which gives you the opportunity to reach a much larger group and reach higher competence of the candidates" (R11)

> "A lot of it is already up in the day in relation to the Face. There is an engine behind it when we post a targeted ad. A good "engine" will be able to go out to read online and in the financial newspapers and such places to find out where it is good or bad and then direct ads towards these "(R10)

> "…get targeted ads for the right candidates. More subtle presentations…" (R5)

The benefit due to target / tailor candidates is widely used among the respondents, for example, by using social media engines. However, a commercial tailor/target application still concerns several factors, for example, whether the data applied is suitable for the population that may differentiate the success factors, and as argued by Weiers (2008) the power is within data, and concerns both quality and quantity.
One may assume that at the end of the day it is all about finding and attracting candidates or more precisely, the most attractive candidates interested on your organisation, and as pointed out by a respondent:

> "…It is about getting a candidate interested in your company. By using AI, you increase the chance for the candidates will come to you…" (R4)

Reviewing Holm (2012), the attraction process may be argued as a static and sequential process, for example, when the job descriptions are manually made, you post the ad in selected medium, and then you wait for the applicant to send their applications. One may argue the traditional process as ineffective, and is implicitly costly compared to the chatbots' ability to target candidates 24/7 to answer questions and recommend targeted information. The respondents' support the efficiency gain, and respondent R3 provide a suitable description of the benefit:

> "Profiles can be enriched, targeting will be precise (ads) based on more factors, and everything will be in place before personal call, no cold calling. It's all about chat bots. As soon as we will be in touch, they will be ready/interested in a new job." (R3)

The traditional manual sourcing, with the purpose of finding proper candidates among the variety of resume databases, argued by Lee (2005) as time consuming and ineffective. Further on Ibrahim and Hassan (2019) argue a modern approach using AI is accordingly more efficient in comparison to traditional methods within the hiring process. The benefit of AI in that matter may relate to the recruiting tool's ability in examining all kind of sites, both personal and non-personal in order to find candidates, whereas the process

may be fully automated. The respondents acknowledge the benefit of automatic resume sourcing:

> "What changes the process is that AI searches automatically. You do not have to go through profiles manually. Our systems retrieve all relevant info on LinkedIn etc. Then we get the candidates automatically on our platform…you do not make personal contact. You send out message to the right candidates. Chat is also possible…" (R4)

> "…as it works today, I enter the position in our system. Then I immediately get suggestions for candidates who can fit. So even though I have not advertised the position, I get suggestion from the databases…" (R10)

One may argue that an implicit benefit of using advanced algorithms concerns the ability to find and attract the passive candidates, that actually are not looking for new job opportunities, and currently satisfied with the work conditions. Further on as argued by Iqbal (2018), AI´s sophisticated algorithms contribute in recruiting quality candidates, and engage the passive candidates.

The respondents highlighted the important benefit in chasing the passive candidates:

> "The job seekers are not actively looking for a new job, but are sitting quietly at their workplace. We know that 80% who have a permanent job can imagine changing jobs if the right opportunity arises. With AI, you can be on the right "sides" that appear. To attract the passive applicants…" (R4)

> "…AI can help reach out to those who are not active job seekers. "(R6)

Chapman and Gødøllei (2017) argue that some of the benefits within e-recruitment concern high speed and high volumes. The survey by Personnel Today (2009) revealed that 97% of the e-recruitment users expected increase in applicants (Williams, 2009). The

data analysis clearly demonstrated speed and volume as important benefits for the respondents:

> "In a perfect world, they will have better time to work more with the other tasks. Often the other processes suffer because you spend too much time searching for candidates. It will give you candidates faster and free up time to make the rest of the process more professional." (R10)

> "…Handling large volumes, cost-saving, shorter search time, more targeted and efficient data management... "(R8)

The findings revealed an additional benefit related to speed. Due to the war for talent, speed is crucial of being the first movers towards candidates, with the aim to secure candidates before the competitors. Cappeli (2001) supports this view and argues that benefits within e-recruitment relates to speed and securing a pool of candidates.

> "In my industry, speed is an essential part of being competitive and getting the commitment from the best candidates. AI can give quick feedback to both relevant and irrelevant candidates, saving the recruiter time making individual responses. (R7)

> "…pace…reach out to the right candidates first..." (R6)

Upadhyay and Khandelwal (2018) argues that AI enables proactive activities in poaching targeted candidates prior to when the application is sent. One may argue that Chatbots or virtual assistants powered by AI may inherent the properties of performing both attraction (sourcing) and selection (screening) as parallel activities. This may be illustrated by the IBM chatbot Watson (WCA) acting as a relationship builder with the purpose of leading the prospect to become a jobseeker. Furthermore, the chatbot actively collect data from resumes, and other targeted channels, for example, from Facebook and LinkedIn, whereas the chatbot analyse, and push targeted information, concerning proposed jobs and job fit (Guenole & Sheri, n.d.). One may propose the illustration shows that screening happens

in real time, maybe prior to candidate awareness, in parallel with the sourcing, and in accordance with some of the respondents:

> "…So even if we talk about screening, sourcing appears to much in one go. Sourcing and screening becomes more of a task…typically sourcing are the two to five candidates you want to interview…choose the different properties, and integrate into the position and narrow down to the two most suitable candidates" (R11)

> "…You can screen candidates fast. So, search and screening become one and the same operation. Increase efficiency and shorter process time." (R8)

One may propose that the power of AI within e-recruitment may cover the entire hiring process due to speed, scale, and automation. For the purpose of screening, the benefits achieved by the use of fast track pre-screening algorithms ranking the most suitable candidates. Further on, one may suggest the IBM Watson Recruitment (IWR) algorithm as being a proper example. The IWR sort and rank the most suitable applicants using advanced algorithm inherent the ability to predict the probabilities for the applicant to have success in the job, the applicant to accept the job, the applicant's culture fit, among more, and inherent the functionality to survey the hiring process bias detection (Guenole & Sheri, n.d.). Upadhyay and Khandelwal (2018) argues that AI algorithms may proactively fight bias, thus typically the algorithms do not allow bias sources such as gender, race, age etc.

For the purpose of interviewing, one may argue for the benefits achieved by an AI powered video interview. The AI powered video interview platform, HireVue, as a proper example. A virtual assistant conducting the interview with the candidates, whereas the advanced algorithm continuously analyse psychological characteristics behaviour on a micro level. This includes facial expressions, body language, voice and tone characteristics, and lastly the candidates' answers to the virtual assistant questions (Feloni, n.d.). Further on, as argued by Ibrahim and Hassan (2019), that AI powered interview platform may contribute to increased accuracy and more precise selection, and

as concluded by Greetha and Bhanu (2018) “AI technology has tremendous impact on recruitment activity as it enables the recruiter to align all some unstructured candidate bio-data, construct profile into uniformity, identify match and skill sets required for the industry” (p. 69). Several of the respondents supported these benefits:

> “Bias is to treat people equally regardless of gender, age, ethnicity, etc. that one is in fact independent in that way. That's probably the most important part. …” (R8)

> “…The entire interview can be automatic. Algorithms questions are posted in advance, then AI can make sure you have asked all necessary follow-up questions that you need to form an overall picture of the candidate. (R11)

> “…Bias out…extremely many ‘random’ decisions are made on the completely wrong basis. A classic thing I hear from the recruiters is that “I understood 30 seconds into the interview that this was a candidate who was not right”. (R12)

WCA, IWR and HireVue are advanced algorithms using ANN and deep learning to make predictions similar to a human brain (Norvig & Russel, 2016). The benefit may be argued that the virtual assistant may inherent the human brain capabilities, but powered with speed and capacity beyond any human’s capacity and conducting a bias free hiring. However, it may be proposed that achieving the full benefits may not be a straight forward operation, as the aforementioned algorithms are exposed to emotional intelligence, and as argued by Brookhouse (2020) humans are still superior machines concerning context. One may further assume that a continuously progression as datasets containing emotion recognition availability keep on increasing (IdeaKeep, 2018b). This respondent may have hit the bullseye:

> “…If you can tie all info together from AI, what kind of person is ideal, then it is magic.” (R1)

One may argue that the implicit benefits within the hiring process due to the AI´s ability to target ads, proactively sourcing crawling the world wide web, automated screening and AI powered video interviews may be considered as a game changer compared to traditional recruitment. Thus, in general terms, the benefits such as speed and efficiency are impacting the process and in accordance with (Cappeli, 2001; Chapman & Gødøllei, 2017; Lee, 2005). Furthermore, the efficiency may lead to a positive financial impact, and as argued the benefit concerns cost savings or cost-effective solutions (Cappeli, 2001; Lee, 2007; Thomas & Ray, 2000). However, the efficient and cost-effective hiring processes may gain a huge advantage, when the algorithms are set up properly and continuously validated, that will accordingly be discussed. The survey by personnel Today (2009) indicated that 86% used e-recruitment due to cost effectiveness, 97% increase in applicant's volume, 66% increased diversity, that may illustrate the positive view the due to speed, volume, and cost impact (Williams, 2009).

One may consider the property of AI to fight bias, as previously discussed, as a very important matter in contributing to a diversified hiring process and attracting quality candidates, reducing the "mini me" pitfall. Further on, as argued by Uphadway (2018), by utilizing AI may increase the diversity and the quality when hiring. The majority of the respondents support the benefits such as effectiveness and quality:

> "For positions with a high number of applicants, having an AI system will filter through candidates and can initiate a screening interview with the candidate. This saves a lot of time for the recruiter. In theory, an effective AI system is capable of producing a narrowing down a large pool of applicants into a shortlist in a very efficient manner." (R7)

> "…Speed, increase the amount of candidates..." (R10)

> "Better quality and higher speed, quicker response." (R3)

> "Handling large volumes, cost savings, shorter search time, more targeted…" (R8)

5.1.3.2 Pitfalls

Chapman and Gødøllei, (2017) argues that the benefits of high volume impact due to the 24/7 reach of applicants, but also acknowledges that high impact volume may result in unmanageable volumes for the organisation. Further on volumes may increase the cost due to additional headcount needed in handling the volumes. One may argue that high volumes may negatively impact the recruiter's response time towards candidates, and are either picked up by competitors, or lose interest for the organisation due to lack of communication. Volume and speed may be a disadvantage if the prediction of the algorithm is poor, and as argued by Weiers (2008) the power data lies within both the quality and quantity. Further on, the HR Daily adviser (2017) reported that 70,4% of the respondents highlighted unqualified applicants as the main disadvantage using e-recruitment, and 29,6% responded to high volume of applicants in general as a disadvantage indicating challenges using the technology (Davis, 2017). The survey by jobs.as.uk (2013) highlighted the lack of quality candidates as the main disadvantage of using e-recruitment. Lee (2011) argues that when organisations stop using e-recruitment it may concern ineffective recruitment tools managing the high volume of unqualified applicants. Considering Thomas and Ray (2000) arguing e-recruitment as a wide range of components inherent a variety of specifications and properties, a general feedback or consensus concerning the 70,4 % reporting unqualified applicants may seem impossible. Lee (2005) argues that in order to have the full advantage of e-recruitment, it requires a fully integrated system covering all aspects of the hiring process. One may argue Lee (2005) statement as reasonable, for example, adopting a single search agent with the capabilities to push and pull information towards candidates may generate high volumes of candidates, but not necessarily be the best fit for your organisation. However, including an algorithm inherent decision support, may pre-screen, evaluate, and narrow down the volume to few quality candidates. Further on the system is still not holistic, and as argued by Allden and Harris (2013), without a holistic system covering candidate relations, it may be difficult to obtain the advantages that e-recruitment offers, thus may require a chatbot like IBM Watson, and on it goes. Nevertheless, a holistic recruitment system may not necessarily solve the challenges, as each application may be troubled due

to the pitfalls of automation such as privacy, algorithmic bias, replication and emotional intelligence.

Madrigal (2018) argues that selling private data has become such a valuable affair that it may jeopardize the privacy concern. One the one hand, one may disagree in the reasoning as the GDPR (General Data Protection Regulation) was founded to protect the privacy to individuals concerning big data (European Commission, n.d.). On the other hand, AI models require enormous amount of data, and when Facebook first claimed they are not selling any private information, and in 2018 it was revealed a data exchange deal "selling" private information, one may argue privacy is a concern (BBC, 2018). The interviews revealed that privacy was a concern among the respondents:

> "Scary that they can pick up all the tracks you leave online, and then form a profile on me…privacy "(R5)

> "…Privacy. When it is fully automated…" (R12)

> "…Of course, privacy issues, image recognition can give AI so much help on everything…" (R1)

Wooldridge (2018, p. 46) argues the algorithms may never be better than its makers due to the either conscious or unconscious bias evolved by the humans' activities. One my propose a relevant example of gender and racial bias occurring when one Googles "CEO´s", and the search engine reveals images of 49 white male CEO´s and one image of a female CEO (Smith, n.d.). Bias may occur in many facets mirroring the perception of environments we live in, and when the algorithm output discriminate or act unfairly, algorithmic bias has occurred (Urvashi, n.d.). Bias was highlighted as a pitfall among the respondents:

> "It is the bias that we return to everywhere…set up the algorithms and the outcome correctly, so that AI performs the right search. "(R11)

> "Not good enough data quality and makes wrong decisions based on bias…" (R12)

> "Pitfalls may be that you give the system a bad specification. Then you get something completely different than what you want. "(R10)

When the Amazon hiring algorithm started to discriminate women, the advanced algorithm was eventually shut down. The team creating the algorithm were not able to understand why the algorithm started to discriminate or in other words were not able to replicate the outcome (Mayer, n.d.). The term "the dark secret at the heart of AI" concerns the complexity, and as the AI learns and predict by the behaviour of the data it may not be possible to replicate the outcome (Knight, 2017). One may argue that the lack of transparency of the algorithm may raise ethical concerns, and further on as stated, "…transparent communication is a determining factor in success, guaranteeing commitment and commitment of all in order to advance the company" (Jatoba et al., n.d., p. 100). A few respondents highlighted replication as an issue of concern, and the need for validating of the algorithm:

> "The danger that a robot can learn itself. The ethical aspects are incredibly important……if an AI is good enough." (R8)

> "…A classic example is the Amazon example, where AI began choosing white men…as ideal software developers." (R12)

> "The pitfall is that the testing is not carried out. If you do not have one who checks afterwards, the danger is that you get a negative reputation. Recommend the wrong candidates." (R11)

> "…It works for a certain time, you won't look at it critically anymore, must always validate." (R1)

The weakest spot within AI powered applications may be argued to the ability for the machine to read emotions and context, due to the emotional intelligence characteristics. As stated by Mayer and Salovey (1993), emotional Intelligence is all about perception of your own and others emotions, and further on make decisions due to the context. For example, a candidate is invited for a pre-screening AI powered video interview, whereas the candidate were exposed for a negative relation just before entering the interview. The body language, tone, and facial expression will most likely be affected in that matter. The algorithm, however, is not capable of coping with the context that may influence and disfavours the candidate, however, in recent years the availability for dataset reading emotions are blooming, and may accelerate the power of AI even more within the hiring process (Choudhury, 2020). The respondents were familiar with the emotional intelligence as a pitfall:

> "…An AI will be black or white. To be able to see the human aspect whether a person are nervous or introverted. Such things can be difficult for the AI to register…" (R10)

> "…You may get the wrong info of it, and you get a decision basis that is wrong. It may be unfair to the others candidates, to be left out due to some personality traits." (R13)

> "The pitfall is that AI is unable to read your personality" (R4)

> "…If we have specific requirements specifications that AI does not take into account the personal characteristics…" (R8)

> "The danger is that you trust it completely…without having taken the human aspects with you and bring it back to the algorithm…" (R11)

5.1.4 Competitive Advantage

Considering the demographics and the increasing international trade, one may argue the war for talents is getting tougher. Morgan (2017) argued that the shortage of talents is rising, has changed such that everybody is competing against everybody, and the competition has become global. Previously, the competition was local for both employer and job applicants. An employer in Stavanger, for example, looking for a computer science engineer, the competition concerned maybe a few local companies; however, the war for talents has made the competition global. Evaluating the McKinsey Global Growth model study, it clearly indicates the dramatic shift in the war for talents with a ratio 1:1 concerning active workforce versus retired workforce in 2025 compared to ratio 3:1 in 2015 (McKinsey, 2015). The war for talents demands new recruitment practices to secure for the organisation necessary resources, and as argued by Beechler and Woodward (2009) recruitment may be considered a critical success factor for the organisations' ability to a sustainable development. Considering the Internet of Things (IoT) connecting the world together in a global network, and impacting the communication path for both the employers and applicants. Globalization and IoT might be considered both a threat and/or opportunity, in the war for talents, depending on the organisations capabilities in adopting the new digital era. Further on, considering the study by MIT Sloan Management review and Deloitte LLP stating: "the ability of companies to attract and retain talents was one of the most serious – and most overlooked – digital threats companies faced" (Kane, Palmer, Phillips, & Kiron, 201, p. 17). This may indicate a competitive advantage for those organisations that successfully adopt new and sophisticated recruitment practices and technologies available. Organisations not capable of implementing new technology, for example, due to the financials or competence may lose market share, and as agued by Armstrong (2010, p. 203) recruitment tools and methods are dependent on cost impact, timeline, and the perception of the system´s ability to have a successful outcome. A respondent raise the concern due to the financials and competence gap:

> "…Perhaps more dramatic…to the extent that AI becomes universal and accessible to very many, and the costs are at an affordable level. Then also the competition landscape changed quite significantly, and that means what is the difference between a large heavy player that we are versus tiny companies. These are interesting issues. If we do not build competence then I think we will lose the competitive advantage we have today. "(R8)

A suitable comparison could be Amazon establishing in Scandinavia, inherits their advanced algorithms and Internet platforms offering all kind of items, most likely, completely superior the competition.

Considering the war for talents, a strategic recruitment approach may be appropriate to ensure valuable resources to the organisation. Breaugh and Starke (2000) argued a strategic view concerning "whom to recruit, where to recruit, recruitment sources to use, when to recruit, what message to communicate" (p. 408). Further on, it might be argued an analytic approach as indicated may require both sophisticated recruitment technology, and trained human resources for execution, impacting the organisations investment capital, and tactical procedures. Decision makers may ask for the payback of the investments by means of increased operational performance (Mikkelsen & Laudal, 2016b, p. 136).

Taking the resource based view (RBV) concerns the ability to achieve a competitive advantage by the company's resources, and is suitable for the organisational view to enhance recruitment impact on the organisational performance (Taylor & Collins, 2000). One may assume a proper management of AI powered e-recruitment applications, may positively impact the organisational performance. Breaugh and Starke (2000) however argued that the recruitment research of many studies raised more questions than answers due to unrealistic outcome. Taylor and Collins (2000) stated that due to their findings from their recruitment research there was no empirical evidence concerning recruitment practices and increased operational performance.

Huselid (1995) findings revealed a relation between increased operational performance (productivity), and the number of applicants for the open job positions (recruitment

intensity), but heavily dependent on additional HRM practices empowering motivation. Effective recruitment practices might attract a lot of candidates, and by selecting quality candidates, it may lead to cost efficiency, diversified deliveries, and increased operational performance. Furthermore, depending on the additional motivational practices gaining increased performance, efficient recruitment practices may capture suitable candidates meeting the job description, but as a single practice it may not gain any improved performance. Orlitzky (2007) criticised recruitment research analysing due to a single activity, and not multiple activities capturing HRM practices.

The findings revealed increased operational performance using AI as effective recruitment practices may be linked to Huselid (1995) findings. One may assume a high degree of recruitment intensity, whereas big data characteristics, and target marketing created a lot of candidates, and combined with a pre-screening decision supporting chatbot narrow down, and rank the most suitable candidates. However, increased operational performance, most likely, requires additional elements than effective recruitment practices. The majority of the respondents reported competitive advantage might be linked to recruitment intensity:

> "…if you manage to attract more, it can be a competitive advantage that you manage to attract more candidates..." (R13)

> "…Speed, increase the amount of candidates...(R10)

> "…better quality and higher speed, quicker response… (R3)

> "Handling large volumes, cost savings, shorter search time, more targeted…(R8)

The findings revealed that several of the respondents highlighted a competitive advantage was related to the AI technology itself. The respondents argued by using such sophisticated technology within the hiring process concerned building brand as an innovative organisation to attract interesting candidates. This seems to be in accordance

with the findings by Collins and Han (2004) that revealed a connection between branding (marketing) of the company, and the numbers of attracted quality applicants. The study also revealed no relation concerning the recruitment practices, for example, a traditional approach versus a modern AI powered approach, may not make any difference for the result. This is supported by Foster, Punjaisri, and Cheng (2010), who argued that an appealing view of the organisation beats the methods concerning the hiring process. One may argue a great marketing strategy for an appealing organisation may, most likely, require additional components as previously argued. Some respondents reported competitive advantage might be linked to branding an innovative organisation:

> "For a recruitment company, it will give an advantage in marketing. Candidates may feel headhunted. You do not just want to better portfolio of people in the recruitment company. The company will have a greater appeal." (R11)

> "This will show that we are a company that is "first movers" that are concerned with a new technology. It does something with our brand. Reduces cost because processes are carried out faster and less use of human resources." (R9)

> "One of our values are innovation, we want to be perceived as innovative…that we are the leaders...and set out values high through the use of AI…a game changer against other players." (R8)

Taylor and Collins (2000) argued that recruitment practices may grant a sustained competitive advantage whereas the RBV concept of Barney and Wright (1998) met the VRIO requirements. The proponents of RBV argue by managing the concept VRIO properly may implicitly lead to imperfect market conditions, and a sustained competitive advantage. Within strategic HRM, Kaufman, (2015) argued this may relate to HPWP (High Performance Work Practices) versus increased operational performance. Furthermore, advanced recruitment methods and selection are among the HRM best practices (HPWPs) (Mikkelsen & Laudal, 2016a, p. 35). E-recruitment powered by AI may have the potential to make a difference, and create imperfect market conditions. This

may heavily dependent on the variety of factors within the recruitment practices, for example, as previously pointed out, but not limited to, the pitfalls of AI.
Considering the view of the opponents of RBV, some of the critics noted the causal ambiguity, leaving the decision makers in the darkness concerning the cause and effect led to a competitive advantage (Lado et al., 2006; Lippman & Rumelt, 1982). Another critic of the RBV concerned the disconnection towards the economical market conditions, whereas any higher financial results compared to the competition is a subject of equalization, and is argued that "…the most strategic HRM writers exaggerate the ability of HPWPs to yield competitive advantage" (Kaufman, 2016, p. 384). The critics of the RBV make sense as no one can beat the market, and further on there exists no guidance concerning actions to gain advantage.

Taylor and Collins (2000) recruitment practices contributing to a sustainable competitive advantage may include.

1. Value concerning labour cost efficiency, and the findings among the interviewees may be highlighted due to speed, volume, and quality; implicitly doing more with less resources:

> "…by using AI, it is possible to cut down on resource use and provide a better candidate experience. Gains both on quality and financially." (R8)

> "You will be able to reach more candidates who are potentially correct then without the use of nearby equal amount of resources." (R11)

> "It will cut a lot of time consuming duties and give a faster path to the end goal of presenting high quality candidates. Competitors who work manually will be slower to reach the best people. AI can help recruiters move through the recruiter process much faster than the competitors." (R7)

> "Quality of output will be better compared to traditional agencies, speed of process will increase by AI giving quicker response. It may become 1/10 of what it is now." (R3)

2. Rareness concerning the ability to recruit unique and rare competence. For the purpose of this thesis, an excellent example may be, the ability to hire recruiters who understand the concept of artificial intelligence. The finding among the respondents may be highlighted due to the ability to target desired qualities and to attract the passive candidates to the fully extent:

> "…with AI you can…attract passive candidates…You will be interested in getting the prospect to a job application candidates…you do that by sending out a message, targeted campaign…" (R4)

> "…better targeting, you hit the targeted group." (R9)

> "AI is more targeted and direct…" (R7)

3. Imitability concerns sophisticated and tactical recruitments practices practically impossible to copy among the competitors. AI powered hiring applications may have the best effect as an advanced holistic system. However, applications may be purchased on stock, but the really important matter concerns the data, validation, and analyses as discussed previously. The point is that a sophisticated AI powered hiring system managed properly, and avoiding the pitfalls of AI, may be considered next to impossible to copy. This may be in accordance with Thomas and Ray (2000) who argued the competitive advantage within e-recruitment vanished due to competitors gaining the same advantages. They further highlight that a competitive advantage may be feasible for organisations inherits an effective holistic recruitment system, and states "Organisations that are most effective in harnessing the technology and managing the information flow will be rewarded with a flexibility and speed that no other recruiting source can match" (p. 51). This is also in line with Lee (2011) who argued that to gain the full advantages of e-

recruitment requires a holistic system. Among the respondents only R2's response may be related. First, the response related to the screening questionnaire:

> "It will bring together much more data, you will need a lot of knowledge of how to do it, it will be difficult to copy." (R2)

Then the response related to interviewing questionnaire:

> "Interview technique, but also tools that are AI related in interviewing can be easily replicated and sold. Limited competitive advantage. "(R2)

One the one hand, the differentiation, whereas screening is considered difficult to copy, while interviewing is considered easy to copy, was quite surprisingly. This is because AI powered interviewing processes contain a larger set of variables, and inherits the tricky emotional intelligence compared to, for example, resume screening.
On the other hand, the respondent may consider the objectives due to the complexity within recruitment versus purchasing a more or less standard tool analysing voice and facial expressions. In that case, the researcher agrees with the differentiation.

4. Sustainability concerning the ability to keep the recruitment practices innovative, and out of reach for the competitors in order to develop equivalent. One may assume that the response above implicitly covers this section, and requires no additional elaboration or discussion.

5. Organisation concerning recruitment practices to be aligned with other relevant HRM practices. No relevant findings among the respondents. However, as previously discussed, effective recruitment practices may not gain increased operational performance itself, but rather as a part of an integrated practices within HRM.

5.1.5 Impact on the Recruiting Staff

Considering the technological advancement disrupting the recruitment industry, it may be argued that an impact for recruiters may seem unavoidable for better or worse. One of the pitfalls of AI may be that jobs disappear due to automation, and as argued by Frey and Osborne (2017), 47% of the low skilled jobs may be automated away. The interviews revealed a differentiation between the attraction and selection phase. For the purpose of the attraction phase, the findings revealed that AI may replace the recruiter:

> "The recruiter will be more like hostess…won´t be called recruiter, maybe 'onboarding person' to help." (R1)

> "recruiter can almost be 100% replaced..." (R5)

> "For many, AI will be perceived as a threat because they are deprived on task that are solved by AI." (R8)

> "The recruiter is probably more specialized in the sourcing process…it will be a task that disappear more and more." (R9)

> "…Transition period, it will have a limited impact. In the long run…it will be outdated." (R11)

> "…They are not going to do "operational" repetitive task of tracking down and adding project roles." (R12)

The survey by Bullhorn (2018) indicated that 41% of the jobs within the recruitment industry may be lost to automation. However, on the contrary, 30% suggested that automation will gain more jobs, and the remaining 29% were neutral. For the purpose of the selection phase, the findings revealed a shift for the recruiter.

> "Needs to be more specialized in interviewing techniques, more related to interpersonal relations…" (R1)

> "Focused in the final stage of the total process…checking, following up on advice from AI to dig into certain questions." (R3)

> "…Important to secure candidates and have the personal contact / chemistry." (R6)

> "The recruiters' job is likely to begin at the later part of the process and after the interview has been executes." (R7)

> "Does not get away from the relationship piece…other focus e.g. how to build relationships…" (R9)

The findings may not be surprising as the content of emotional intelligence normally are much more exposed within the selection phase, requiring different set of skills such as intra and inter personal intelligence (Gratton, n.d.). Conversely, the attraction and selection phases tends to integrate as the technology advances, and one may assume requiring new skills and attention already in the start up of the hiring process creating the job description. The ability to gain the advantages AI may offer, depending on the competence and capability within the AI technology and whereas validation of the model, is central (Upadhyay & Khandelwal, 2018). Several for the respondents highlighted skill adjustment for recruitment personnel:

> "Lower educated recruiters will be out of job, unless trained in technical/AI skill. Easier parts of screening (admin tasks) will be done by AI. recruiter will need to know the pitfalls of AI." (R3)

> "Must use expertise and resources in other areas. The recruiter must handle info that comes from AI, and be able to utilize the technology. So, it´s about skill adjustment." (R8)

"The recruiter must start relying on new tools, which most conservative are no so willing to do. We need forward-thinking personnel who are willing to learn…" (R11)

6 Conclusion

The thesis has explored how artificial intelligence may impact traditional recruitment in the war for talents. Four research questions were established as the foundations of the thesis.

Research question 1:

How AI may change the traditional recruitment process.

AI is disrupting the traditional recruitment process as all phases of recruitment is changing from a step by step operation towards continuous parallel activities and interactive communications by chatbots or virtual assistants allowing a 24/7 reach for both job applicant and employer. The ability of target marketing and AI algorithms to crawl the internet processing big data may change the rules in the war for talents. The research showed that holistic AI powered recruitment systems are in reach, but the adoption of AI powered recruitment for the majority is considered a low level concerning pulling data from resumes and a commercial target ads generator. However, a few organizations had adopted a high level concerning fully automated systems. We conclude that AI may be a game changer in the war for talents due to the advanced and sophisticated properties of the technology.

Research question 2:

What is the benefit and pitfalls using AI in the recruitment process.

The properties of AI algorithms may offer a lot of benefits and pitfalls within the hiring process. Our research showed speed, efficiency and cost savings as important benefits, as well as the ability to attract the passive candidates, and increased accuracy within the hiring process were highly valued. Proactively fighting bias in the hiring algorithms may lead to the benefit of diversity for the organisation. The research revealed that the benefits may easily turn into pitfalls due poor datasets and insufficient validation of the algorithms. The pitfalls concern privacy, bias, replication and emotional intelligence, which may lead to ethical considerations and increased cost. We conclude that the

benefits from proper datasets and validation of the algorithms beats the pitfalls, and has a positive effect in the war for talents.

Research question 3:

Does AI in the recruitment process impact the competitive advantage.

The strategic approach in recruitment as argued by Breaugh and Starke (2000), "whom to recruit, where to recruit, recruitment sources to use, when to recruit, what message to communicate" (p. 408) may be considered mirroring the properties of AI hiring algorithms. The research indicated the competitive advantage may be achieved due to recruitment intensity and branding of new advanced technologies, but as a single source capturing great candidates may not be sufficient for a competitive advantage. The research indicated by Taylor and Collins (2000) said recruitment practices may contribute to a competitive advantage due to AI properties meeting the VRIO attributes, aligned with other HRM practices. We conclude the AI meeting the VRIO may generate an imperfect market conditions, and may create a competitive advantage, despite the critics from the RBV opponents, and lack of empirical evidence. This is because the sophisticated technology may include superior recruitment practices when managed properly due to the pitfalls of AI. The victory in the war for talents may belong to those who master the art of AI and recruitment.

Research question 4:

What is the impact for the recruitment staff using AI in the recruitment process.

The research showed that AI may replace the recruiter in the attraction phase due to AI's superior properties in target marketing and searching the world wide web for candidates. The research indicated a shift for the recruiter in the selection phase engaged more towards the tasks requiring emotional intelligence and context. AI implementation within the hiring process indicated the need for skill adjustment concerning the competence in understanding and using AI technology.

We conclude that the era for the “hard core sales recruiters” as the “stars” of the recruitment agencies may be heading for a fall and may be replaced by analytics and psychologists who understand the concept of AI in the war for talents.

Based on the conclusions to the previous four research questions, we conclude the thesis question is answered as: AI may have a superior impact on the traditional recruitment in the war for talents.

6.1 Practical Implications

The advanced algorithms of AI may offer superior properties compared to traditional recruitment. Recruitment applications may become a two-edged sword as it generates a lot of candidates, but may generate high unmanageable volumes of unqualified candidates that will increase the cost.

The adoption of AI powered hiring applications in general is on a low level of advancement. Holistic recruitment systems are in reach, and to gain the most out of the hiring applications, corresponding AI applications are required. For example, a single source recruitment algorithm gaining unmanageable volumes of unqualified candidates could most likely been taken care of by a complementary algorithm sorting and rank candidates properly.

Advanced hiring algorithm’s lack of transparency due to the replication problem may be considered a concern.

AI algorithms’ demand for high volumes of data from searching the world wide web in the search of data (candidates) in both personal and in personal sites, may interrupt the privacy, and may be considered a concern.

AI algorithms that are made by humans are exposed to unconscious bias. An algorithm that is heavily dependent on high quality data, and validation ensures that the algorithm predicts according to the intentions.

AI algorithms performing tasks that require emotional intelligence and understanding of context may require special attention, for example, AI video platforms reading facial expressions, body language and others. Data sets containing emotions are blooming, but the weakest spot of AI may still be reading emotions and context.

A competitive or even a sustained advantage may be achieved for those organisations that fully integrate a AI holistic recruitment system, and continuously develop and improve the platform, keeping the competitors behind.

6.2 Limitations

AI within the hiring process may still be considered in its infancy, and the respondents' varying experience may have answered from their perceptions rather than actual experiences.

In the study we have limited to explore the organizational view, and not the applicant view that may impact the conclusions.

The study is limited geographically and has the views of only a few organizations captured, this may not be representative of the big picture.

The literature may sometimes may not specify the drivers behind e-recruitment. However, the functionality, benefits and pitfalls presented may indicate that AI is powering the e-recruitment applications, this may have impacted the results.

6.3 Future Research

We recommend research concerning the applicant's view of using AI within the hiring process to seek answers for how that may impact the results of the study.

We recommend a wide reach study, comprising the most experienced organisations using AI within the hiring process, verifying the results of the study.

We recommend a study analysing holistic recruitment systems availability, functionality and experience.

We recommend a study concerning the availability and the experience using data set in reading emotions.

7 References

APA 6th Edition is the preference for the thesis.

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7.2 Appendix 1 Interview Protocol

Participant's introduction:

- Name and role and what does your organization do?
- What is your experience within recruitment?
- What is your experience within AI?
- "Artificial Intelligence – A gamechanger in the talent acquisition industry?"
- True or False – why?

Attraction

-How is the traditional attraction process today?

-How is AI changing the attraction process from the traditional recruitment perspective?

-What is the benefit of using AI in the attraction process?

-What are the pitfalls of using AI in the attraction process?

-What is the impact for the recruiters' traditional task using AI in the attraction process?

-How can AI be a competitive advantage in the attraction process?

Sourcing

-How is the traditional sourcing process today?

-How is AI changing the sourcing process from the traditional recruitment perspective?

-What is the benefit of using AI in the sourcing process?

-What are the pitfalls of using AI in the sourcing process?

-What is the impact for the recruiter's traditional task using AI in the sourcing process?

-How can AI be a competitive advantage in the sourcing process?

Screening

-How is the traditional screening process today?

-How is AI changing the screening process from the traditional recruitment perspective?

-What is the benefit of using AI in the screening process?

-What are the pitfalls of using AI in the screening process?

-What is the impact for the recruiter's traditional task using AI in the screening process?

-How can AI be a competitive advantage in the screening process?

Interviewing

-How is the traditional interviewing process today?

-How is AI changing the interviewing process from the traditional recruitment perspective?

-What is the benefit of using AI in the interviewing process?

-What are the pitfalls of using AI in the interviewing process?

-What is the impact for the recruiter's traditional task using AI in the interviewing process?

-How can AI be a competitive advantage in the interviewing process?

General

-What precautions to be done to prevent AI pitfalls such as privacy/replication/bias in the recruitment process?

-What preparations to be done for a successful implementation of AI in the recruitment process?

-Will AI take the job from the recruiters?

7.3 Appendix 1 Confidentiality Agreement

Confidentiality Agreement

AGREEMENT and acknowledgement between _____ (Name) and Frank Ween (Researcher).

Whereas, the Interviewee agrees to the answering of questions asked with the understanding of complete confidentiality and anonymity.

Whereas, the Interviewee agrees to recording of video and audio that will be accepted and deleted once the study is completed.

Whereas, the Researcher agrees to furnish the Interviewee certain confidential understands that information will be collected anonymously and confidentially and that the data collected will only be used for the purpose of this study.

Dated this _____ day of _____ (Month), 2020

The Interviewee

BY: _____
Signed

The Researcher

BY: _____
Signed