



DEPARTMENT OF  
APPLIED IT

# UNDERSTANDING AND IMPROVING QUALITY IN FIRM RECRUITMENT PROCESSES A CASE STUDY

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## **Abstract**

Nowadays, digitalization enables automation of manual work and repetitive tasks. This transformation facilitates higher exploitation of intellectual human resources within allocated working hours. In addition, intellectual demand for making a venture successful grows exponentially, requiring cross-functional intellectual inputs. In this condition, people play a more important role than ever before, making human capital a strategic resource which plays a critical role in the success of a firm. When the focus is on amplification of both individual and team performance, recruitment of a new employee becomes a complex and challenging task because a “wrong” person may negatively affect the entire ecosystem within a company.

Taking into consideration individual peculiarities, internal ecosystem, and challenges of the external environment, recruitment becomes a complex and resource-consuming business process. How can we know that the recruitment process in a particular company is of high quality? And how can we understand what can be improved? In this context we have conducted a case-study within company Z. Through reinforcing the importance of human capital as a strategic resource and analyzing the recruitment process at company Z, we draw insights for providing practical recommendations and lay the foundation for further research. Practically, we suggest adopting a systematic data-driven approach ensuring holistic insight through data defragmentation to facilitate business process maturation. Academically, we conclude that, despite being an effective methodology, Lean Six Sigma is underutilized in non-industrial business processes, and its implications and potential in different types of business processes requires further research.

## **Keywords**

Human Resource, Human Resource Management, Strategic Human Resource Management, Business Process, Lean Six Sigma, Data-Driven Management, Automation

## Foreword

First, we want to thank Jan for the friendly and positive supervision full of insights and inspiration. It is impossible to overestimate the contribution of Jan to the evolution and transformation of our thinking during this thesis. We were extremely lucky to have Jan as our supervisor as he provided us not only with valuable insights and wise mentorship along the way, but also created the space where we could explore our ideas, challenge concepts, and have open discussions about any aspect linked to the thesis project. We are forever grateful to Jan for his inspiring teaching style!

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Finally, how can we overlook the role of people who are always with us no matter what? Our families and friends come last in this foreword, but, needless to say, not least in the role and meaning they played in this transformational journey. Of course, they played a primary role, and we hope they know it and feel it. Their understanding, practical and emotional support are just some of many valuable contributions which we received along the way. Memories from this period of life will stay forever in our hearts.

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## 1. Introduction

Today, firms across the globe are witnessing the largest talent shortage in a decade with 40% of firms reporting hindrance in filling jobs due to a lack of qualified applicants (Landay & DeArmond, 2018). As such, attraction, selection, and recruitment of candidates becomes an even greater challenge than ever before. There exists an enormous amount of research on how Human Resource Management (HRM) practices affect firm performance. HRM have been associated with such performance indicators as turnover rate, productivity, financial returns, survival, and firm value (Delery, 1998). Thus, effective, and efficient business processes within HRM are crucial for organizations to achieve their strategic goals.

A Business process is “a collection of activities that take one or more kinds of inputs and create an output that is of value” (Aguilar-Savén, 2004). These processes represent the relationship between inputs and outputs or, in other words, how the inputs are transformed to outputs by a series of value-adding activities. Business processes may differ contextually and can be performed by humans, machines, or jointly.

Recruitment is one such strategic business process and a part of HRM that exists in all organizations, regardless of industry or sector. It is an internal business process that is of pivotal importance as its primary concern is building and developing the strategic human resource capital. From formulating a requirement profile to onboarding of a new employee, there is a long sequence of steps with multiple interdependencies. On top of it, recruitment is such a business process that cannot be fully automated because it requires human judgement in decision making along the way. In such complexity and involved subjectivity, how can we know that a recruitment process within a particular organization is of good quality? How can we understand which steps or aspects within it to improve?

In this thesis, we focus on the importance of a recruitment process for organizations to secure their long term strategic competitive advantage. In addition, we aim to understand how we can analyze a recruitment process to identify possible improvement opportunities. As such, our research question is framed as follows:

*“How can we understand ‘quality’ in a recruitment process?”*

*How such quality can be achieved?”.*

To answer this question, we choose to do a case study of the recruitment process of company Z. First, to re-emphasize the strategic importance of the recruitment process, we rely on the Resource-Based View (RBV) of the firm. RBV is one of the commonly used theories in strategic management that advocates the importance of building up and exploiting internal resources in gaining competitive advantage (J. B. Barney, 1991; J. B. Barney et al., 2011). In line with this philosophy, when built thoughtfully, human capital becomes a source of competitive advantage. Second, to analyze the business process within company Z, we choose Lean Six Sigma (LSS) - a data-driven business process improvement methodology that is a combination of Lean and Six Sigma philosophies. While Lean advocates the elimination of waste by categorizing each activity as value-adding/non-value adding/waste, Six Sigma advocates the improvement of efficiency by reducing variations.

Needless to say, there exist multiple pieces of research that exemplify the usefulness of LSS to improve different *manufacturing* business processes. However, when it comes to research exploring LSS in *knowledge-based business processes requiring professional judgement in decision making* at different stages (ex. Recruitment process), - the body of existing literature is limited. Also, though there is a plethora of research on various aspects of the recruitment, there is very limited research on its improvement itself as a business process.

As such, ***practically***, we hope to help company Z to identify and determine the core reasons for inefficiency in their recruitment process and suggest ways to improve it. ***Academically***, we hope to make two major contributions. *First*, we aim to add to the existing limited knowledge pool on the application of LSS to knowledge-based business processes requiring professional judgement in decision making. *Second*, we aim to contribute to the HR management literature by providing useful insights on recruitment process improvement.



## **2. Related Work**

This section outlines the theoretical background of our study. There are two broad classifications of the concepts: the workforce management aspects and business process improvement aspects - the details of which are below.

### **2.1. Workforce Management Aspects**

#### **2.1.1. Human Resource Management (HRM)**

With its roots in the 1800s, the area of HRM in present time is concerned with much more than theories of employee relationships and motivations (Villeda & McCamey, 2019). Prior HRM practices referred to activities and functions that were necessary for the effective management of a firm's workforce. Such activities intended to attract, retain, and motivate employees. However, in the present globalization and digital scenario, the workforce constitutes the primary wealth of a venture with the collective knowledge, skills, experience, intelligence, motivation, and ambitions (Srivastava & Das, 2015). With increased global competition, a firm's ability to attract talented personnel is a key determinant of its effectiveness (Villeda & McCamey, 2019).

HRM today is concerned with formulating policies, processes, and systems that incorporate employee performance into the overall company strategy (Villeda & McCamey, 2019). There exists an enormous amount of research on this aspect of human resource management. Delery (1998) describes how HRM practices have been linked with diverse business objectives like turnover, productivity, financial returns, survival, and firm value - and evolved into Strategic Human Resource Management (SHRM). Truss & Gratton (1994) describe how SHRM links HRM practices with strategic goals and objectives of a firm to improve business performance and develop organizational cultures that foster innovation and flexibility. SHRM is a new discipline that has emerged because of the integration of HRM into the strategic management process. SHRM stresses the importance of aligning HRM practices with the strategies of an organization, the importance of coordination among various HR practices and is defined as "the pattern of planned human resource deployments and activities intended to enable an organization to achieve its goals" (Wright & McMahan, 1992).

The key activities of HRM include human resource planning, staffing that comprises recruitment, selection and socialization, appraising, compensation, training and development, and union-management relationships (Schuler & MacMillan, 1984). In this paper, we are focusing on the recruitment process.

### **2.1.2. Resource-Based Theory (RBT) of workforce as a source of competitive advantage**

Firms' resource-based view has emerged as an important area of research within the strategic management field over the last two decades (J. B. Barney et al. (2011); Galbreath (2005); Wright & McMahan (1992)). This theory views a firm as "an equivalent to a broad set of resources it owns" and focuses on the analysis of the resources owned by a firm. As against the traditional strategy research that emphasizes on seeking a strategic fit between the internal characteristics and external environment, to achieve competitive advantage, RBT takes an inside-out approach and emphasizes on aspects internal to the firm. Simply put, what a firm accomplishes is determined by what a firm possesses and thus, a firm should pay more attention to its resources than its competitive environment (Das & Teng, 2000).

The concept was first put forth by Wernerfelt (1984) and based on the idea that the success of a firm is to a large extent determined by resources owned and controlled by it (Galbreath, 2005). Scholars further added that a firm's resources can be a source of competitive advantage only in case of resource heterogeneity and immobility. While firm resource heterogeneity refers to the differences in the resources possessed across firms, immobility refers to the inability of competing firms to obtain resources from other firms. Also, some important attributes of a resource to be a source of firm's competitive advantage are that the resource must add positive value to the firm; the resource must be unique and rare to find among competitors; the resource cannot be imitated by the competitors, and the resource cannot be substituted by other resources by competing firms (Wright & McMahan, 1992).

Galbreath (2005) defines a resource as "a firm level factor that has the potential to contribute economic benefit". Resources can be fundamentally of two types (a) tangible resources that include those factors containing financial or physical value as measured by the firm's balance

sheet for example money, equipment, property etc., and (b) intangible resources that include those factors that are non-physical or non-financial and are rarely included in the firm's balance sheet like the skills, culture, knowledge, brand etc. Such intangible assets apparently fall into two categories namely assets and capabilities. While the intangible resource that the firm "has" is an asset, the intangible resource that the firm "does" is a skill or a capability. In other words, capabilities refer to the ability of a firm to manage and exploit the available resources and skills, maximize value creation, and thus achieve competitive advantage.

### **2.1.3. RBT and Strategic HRM**

An underlying aspect of RBT is that a resource is firm specific and that it cannot be separated from the firm. The view through RBT - Resource Based View (RBV) - of the firm is a widely used concept in HRM literature to stress the strategic importance of the workforce. In line with the inimitable, heterogeneous, immobile, irreplaceable, and valuable attributes of a resource, for human resource to be a source of sustainable competitive advantage, employees must (1) add value to the firm; (2) workforce's skills and competencies must be rare and unique among competitors; (3) a firm's human resource represented by its employees must be inimitable; (4) a firm's human resource must be such that it is irreplaceable by its competitors. SHRM literature is based on a general underlying assumption that workforce per se cannot be a source of sustainable competitive advantage and that it takes effective HRM practices to transform the human resources in a firm to human capital that generates sustained value to the firm. When firms have jobs that require different types of skills and when individuals differ in their types and levels of skills, proper recruitment and selection processes can ensure that the firm's value can be enhanced by matching the necessary skills with the right individuals who possess those skills. Through a combination of valid selection programs and attractive reward systems, a firm can obtain rare skills. Investments in firm-specific HR practices such as training in firm-specific skills, on-the-job experience, coaching and mentoring can qualitatively differentiate a firm's employees from those of other firms and can make human capital less imitable. The rationale here is that effective HRM practices make the human resource a source of sustainable competitive advantage (Abhayawansa & Abeysekera, 2008).

Also, a firm's recruitment process itself can offer a competitive advantage if it fulfills all the criteria of the RBV. First, thoughtfully designing a recruitment process can add *value* for the

firm by enhancing the quality of the applicant pool and reducing the associated costs simultaneously. Second, well formulating a recruitment strategy can help identify, attract, and retain *rare* talent in the labor market. Third, designing a tactical and unique recruitment practices/process can be inimitable by the competitors. Fourth, an appropriate and innovative recruitment process, local to the firm’s context can be a *non-substitutable* organizational practice. Thus, recruitment can serve as a source of competitive advantage if it meets the above-mentioned criteria and is well aligned with other HR practices (M. Taylor & Collins, 2000).

Thus, considering the RBV of a firm and applying it to the human resource within it, we can say that the workforce of a firm constitutes its most valuable resource. Also, as discussed in SHRM literature, a well-structured and effective HRM practice that makes the firm’s human resource a source of competitive advantage becomes necessary and inevitable. So, now that we know that the workforce with their unique skills, knowledge, culture etc., can be an asset to the company and that effective human resource practices should be in place to achieve this, we move forward to the topic of recruitment process improvement that is the focus of this paper.

**2.1.4. Recruitment Process**

Over the years, as the field of HRM has grown and evolved into a complex and cohesive management topic that is commonly referred to as SHRM, the specific area of recruiting, followed by screening and selecting have also evolved. While around 75% of the candidates were reached through newspaper advertisements during the 1950s to 1980s, web-based recruiting sites like monster.com, hotjobs.com etc., were used by the end of 1900s, opening the path for online job seekers. Recruitment in the present day is mainly based on the internet, where employers use social networking sites like LinkedIn to find the best fit to fill their open positions (Villeda & McCamey, 2019).

**Definition of recruitment**

There is a plethora of work on the definition of the recruitment process in the management stream. Some of the definitions of the recruitment process are as shown in Table1 below.

Source	Definition of Recruitment
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<b>(M. S. Taylor &amp; Bergmann, 1987)</b>	“A process of seeking out and attempting to attract individuals from the external labor market, who are capable of and interested in filling job vacancies”
<b>(M. Taylor &amp; Collins, 2000)</b>	“A process that includes the set of activities undertaken by the organization for the primary purpose of identifying a desirable group of applicants, attracting them into its employee ranks, and retaining them at least for a short term”
<b>(Sangeetha, 2010)</b>	“A process of identifying and hiring the best-qualified candidate for a job vacancy, in a most timely and cost-effective manner”
<b>(Villeda &amp; McCamey, 2019)</b>	“A process of attracting qualified job candidates to a company, its objective ranging from filling vacant positions, identifying the type of candidates sought, and the time to fill the positions”

◆ **Table 1: Definition of Recruitment**

From the above table, it is evident that while some scholars view recruitment process as the initial and most important phase of finding a candidate pool for an open position, followed by screening, and hiring processes, some scholars describe it as an all-inclusive process that comprises of everything from identifying an open position to extending a job offer. In this paper, for the sake of simplicity and to be able to align with the interests of our case (company Z), we stick to the view of the recruitment process as shown in Figure 1. In the rest of the paper, when we use the term recruitment, we mean the all-inclusive process.



◆ **Figure 1: Steps Involved in Recruitment Process (Source: medium.com)**

**2.2. Process Improvement Aspects**

**2.2.1. Business Process Improvement (BPI)**

Business processes lie at the core of organizations and businesses. **Business process** is a series of connected steps performed by people or equipment in an organization to achieve their goals. The discipline **Business Process Management (BPM)** was developed in the 1990s and is meant to manage end-to-end processes (Andellini et al., 2017). Within BPM, the concept of BPI was adopted. **BPI** is a set of activities meant to analyze and review business operations for the

sake of their improvement. BPI is the key mechanism for organizational development towards effective management of their activities and resources. As Tony Bendell (2005) from the Centre of Quality Excellence at the University of Leicester in the UK summarizes, many BPI approaches share common features or even include one another. However, in its core, many process improvement approaches include process mapping, analysis, deep comprehensive understanding of each process step, and further improvement (see Fig. 2).



◆ Figure 2: General model of the Business Process Improvement (BPI) concept (adopted from Bendell, 2005).

There exist multiple BPI methodologies: Kaizen, Process Excellence, Re-engineering, Agile Management, Total Quality Management, Just-In-Time, Design of Experiments, Hoshin Planning, Poka-Yoke, Lean Management, Six Sigma, Lean Six Sigma. However, as Gershon(2010) concludes, the “mother of all” process improvement methodologies is the Total Quality Management (TQM) which put the notion of quality in the center of any process (Gershon, 2010).

### **2.2.2. What is Quality?**

There exist multiple points of view on the notion of quality, their investigation reminds the story about an elephant and blind men. This story appeared in India from where it has widely spread (Courtesy: Wikipedia). It is a story about a group of blind men (or men in the dark) touching an elephant to learn what it is. Each one explores only one part, such as the side or the tusk. Then they compare their notes and learn that they are in complete disagreement about what they have touched (see *Img. 1*). The same applies to quality. The notion of quality is complex, and its definition evokes multiple discussions depending on a perspective. From Latin Language,

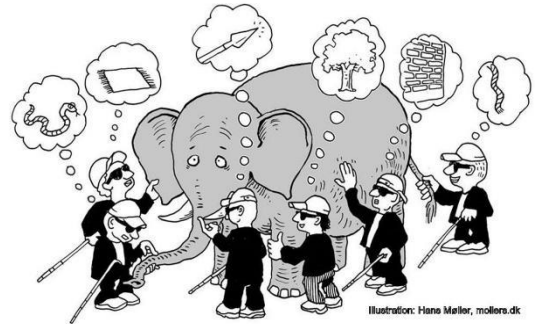
“Qualitas” means character. Over time the word “quality” was grounded on “Qualitas” (Bergman & Klefsjö, 2001).

On many occasions, quality is contextual, and organizations come up with their own view on quality. Moreover, depending on focus areas, there may be different definitions of quality within one organization (Foster, 2004). Discussions on “quality improvement” begin with understanding of “quality” and its attributes within a particular context. William H. Kincaid (1980), a lawyer practicing in safety professions in his paper “Issues in the Definition of Quality” summarized: “quality is what we agree it is”.

According to Bergman & Klefsjö (2001), quality is defined as:

*“The ability of a product or a service to satisfy, or most preferably, exceed, the customers’ expectations” (Translated from Bergman & Klefsjö, 2001, p. 21).*

Within the context of this paper, we agree with Bergman & Klefsjö (2001) and link quality to meeting and exceeding expectations.

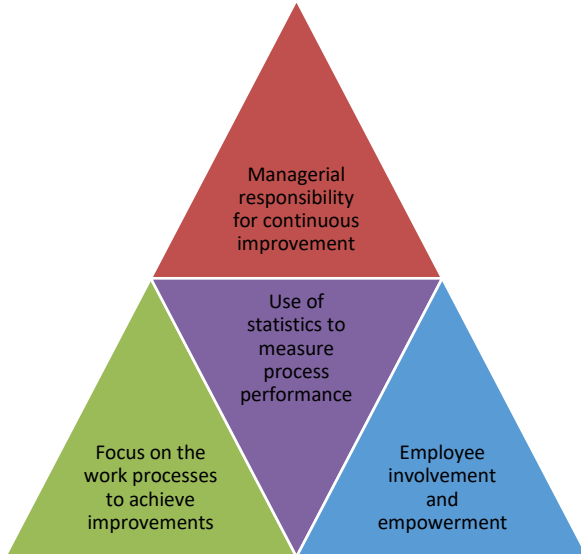


✿ Image 1: Illustration by HANS MØLLERS

## Origin of the Quality Management

The wave of quality management started after Crosby (1979) published his best-seller “Quality Is Free: The Art of Making Quality”. Philip B. Crosby was an entrepreneur, businessman, author who made a significant contribution to the quality management practices and management theory. The key philosophy of the book is that it is cheaper to do things right from the first attempt.

*“Do things right in the first place, and you won't have to pay to fix them or do them over.” (Crosby, 1979)*



◆ Figure 4: Four key areas of quality management adopted from (Gershon,2010)

- 1 Create a constant purpose toward
- 2 Adopt the new philosophy.
- 3 Stop depending on inspections.
- 4 Use a single supplier for any one item.
- 5 Improve constantly and forever.
- 6 Use training on the job.
- 7 Implement leadership.
- 8 Eliminate fear.
- 9 Break down barriers between departments.
- 10 Get rid of unclear slogans.
- 11 Eliminate management by objectives.
- 12 Remove barriers to pride of workmanship.
- 13 Implement education and self-improvement.
- 14 Make "transformation" everyone's job.

◆ Figure 3: Deming's 14 points

The book planted the seed in the minds of managers the idea that process improvement is not a one-time-action, but iterative and ongoing. Since then, TQM started to form as a methodology. Several years later, another book which was named “Out of the Crisis” (Deming, 1986), originally published in 1982 and then re-published in 1986, affected the evolution of

quality management and TQM in particular. The book was written by Dr. William Edwards Deming - engineer, professor, and management consultant. Dr. Deming proposed a theory of



management which includes 14 Points for Management, commonly known in contemporary literature as Deming's 14 points (see Fig. 3).

The book addresses principles of management transformation and how to apply them (Deming, 1986). These principles cover four key areas (See Fig. 4) and form the core of TQM as it is known today – exactly the one which was the global standard for quality management for 20 years and, according to Gershon (2010), is the “mother of all” process improvement methodologies.

### **‘The evolution of BPI’**

Since 1980 by creating structure and system, TQM was evolving and became an umbrella for all the earlier existing tools and methodologies (Gershon, 2010). TQM became a powerful movement generally accepted as THE quality control and process improvement methodology.

However, Gershon (2010) suggests that, despite its comprehensiveness, it had fundamental blind spots. To make TQM work, the old patterns, culture, and behavior of an organization have to be changed. The comprehensive management approach and fundamental transformational changes are important to succeed in TQM, yet on many occasions, only few tools are selected in hope that they will solve all the problems. Experts argue that unclarity of structure and lack of guidelines in TQM could result in failure (Klefsjö et al., 1999).

In 1980 when Motorola wanted to cut their costs by half and to meet these targets, Bill Smith introduced a new approach which is known today as Six Sigma -  $6\sigma$  (Foster, 2004). Rowland Hayler and Michael D. Nichols (2007) explain the history of Six Sigma as having “originated at the Motorola Corporation in the United States in the mid-to-late 1980s and were subsequently expanded at GE and other leading firms during the 1990s.” Six Sigma has been recognized as a transformational approach and was spread across multiple areas and industries (Harry & Schroeder (2000); Breyfogle (2003)). First in manufacturing, and more recently into service and transactional industries (Hayler & Nichols, 2007). Three key aspects which led to TQM critical review were:

1. First, during the analysis TQM focused on a business process underestimating its human context and managerial component (Gershon, 2010). Six Sigma takes into deeper consideration the “people” side of business processes and incorporates it in its methodology. Methodologies constitute a certain set of activities that enable reaching the target values and goals

(Andersson et al., 2006). In addition to the process itself, Six Sigma looked at people who were working with the process and managers which led it (Gershon, 2010).

2. Second, during the improvement stage, group-effort, work in teams, and shared responsibility were not really part of TQM (Gershon, 2010), whereas Six Sigma implements the structure of belts, and requires management involvement to back the entire processes up. Six Sigma emphasizes the importance of teamwork and shared responsibility under supportive leadership for getting an accomplishment.

3. Finally, despite having an impressive arsenal of tools, TQM never defined a step-by-step structured methodology for its implementation (Gershon, 2010). TQM initiatives work without fully knowing anticipated benefits, milestones, scope of the project, and the possible financial gains. However, empirical research proved that structured approach is more effective (Reid, 2006). Six Sigma bridges the gap and provides a well-defined five-steps model called DMAIC (see section 2.2.3.2. *Lean Six Sigma: DMAIC*) which establishes a flow for any process-improvement project, helps to identify exact problems, and make precise measurements of result (Harry & Schroeder, 2000).

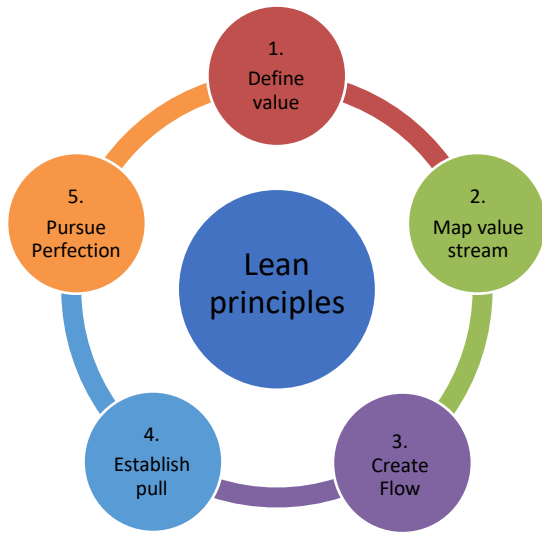
Being grounded on TQM, Six Sigma includes all its tools and philosophies, bridging the gaps in all the weak areas of TQM. Moreover, it fuels its strengths through more advanced statistical tools (Gershon, 2010). Six Sigma is a strategic, company-wide approach, based on project-by-project improvement with the majority having the ‘Cost-Down’ focus. Six Sigma links companies’ financial performance to process performance and aims to increase firms’ profitability through decreasing the cost of poor quality of business processes (Hayler & Nichols, 2007).

Six Sigma, inheriting most of the content from TQM, becomes an umbrella for most of the BPI methodologies. The exception is the system called Lean (Gershon, 2010).

The philosophy of Lean comes from a Japanese manufacturing industry. It was developed by Bob Hartman, who at that time was a part of Toyota (Gauci, 2010). In simple words, Lean is about creating most value with minimum effort – it is often about making the processes simpler, creating more room for those actions that bring most of the value (Womack & Jones, 1996). Since it appeared, across the whole world services and manufacturing industries implemented Lean within their businesses. Lean categorizes activities into those which:

1. add value (to be optimized)

2. do not add value (to be reduced)
3. waste (to be removed).



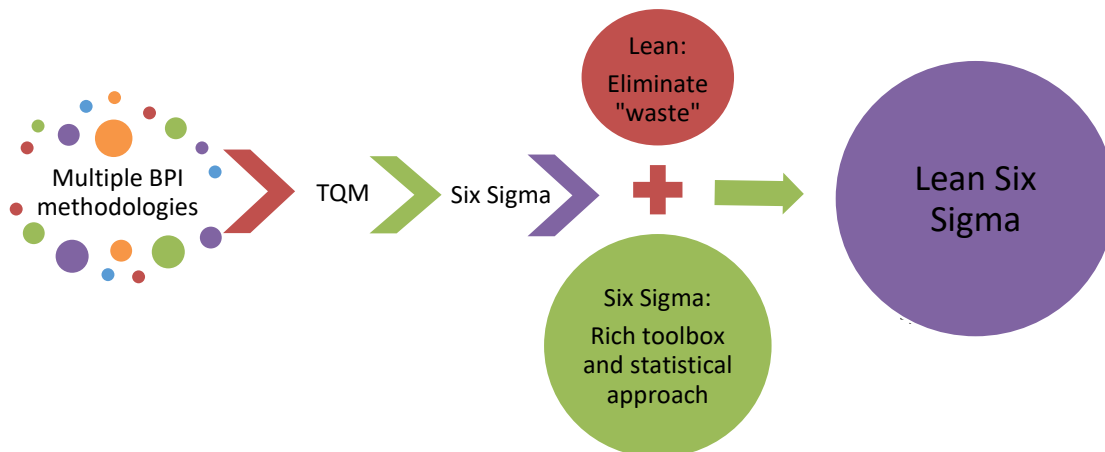
◆ Figure 5: Five principles of Lean (Adopted from Womack & Jones, 1996)

Lean methodology consists of a set of tools focused on identifying and eliminating “waste” in business processes across organizations –activities which do not create value, like re-work and poor coordination. This approach requires strong focus on the value element of all products - the ‘Value Stream’. Womack & Jones (1996) identified five key principles of a Lean organization (see Fig. 5).

Lean and Six Sigma were originally two separate business philosophies and management principles. Recently Lean and Six Sigma have been merged into Lean Six Sigma suggesting the

best of both worlds (see Fig. 6). Lean Six Sigma focuses on eliminating problems, removing inefficiencies, improving working conditions and, making sure that business needs are better satisfied. It combines the tools, principles, and methods of both Lean and Six Sigma.

It is discussed in literature as “the method of the future” and “the best” process improvement methodology which has been developed so far. It incorporates more tools, considers more situations, and delivers results faster than Six Sigma alone. Lean Six Sigma is the evolutionary edge of quality management and business process improvement methodology.



◆ Figure 6: Etiology of Lean Six Sigma

### ✔ **Summary of the section**

This section described all the work that was found relevant to our topic and covered the broader areas of knowledge being considered. The introduced theories are meant to help a reader understand our study.

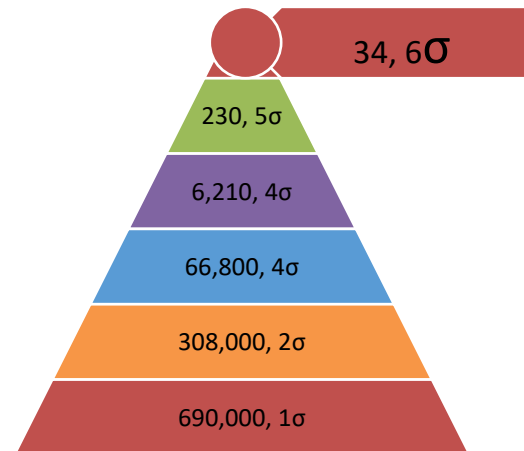
### 3. Conceptual Framework

This section describes in detail the conceptual framework, Lean Six Sigma that led us in our study and that will be used to make sense of the data collected.

#### 3.1 Lean Six Sigma

Lean Six Sigma is a methodology that increases performance and makes a process more cost-effective (Snee, 2010). It has been proven to be successful in multiple industries helping them to achieve their business goals. Methodology offers many benefits to business such as increase in profits, standardization and simplification of processes, errors reduction, and employee development (Hayler & Nichols, 2007). Lean Six Sigma focuses on variation reductions during business processes and is utilized for improvement of repetitive procedures. It is a means to approach business processes scientifically and iteratively, enabling ongoing improvement (Snee, 2010). If Lean is about

doing more with less while doing it better, Six Sigma is about quality. Coming from statistics the term “six sigma” is used in statistical quality control. It heavily reflects the statistical nature of the methodology. Collecting and analyzing data is the core of any Six Sigma process improvement project. Six Sigma provides multiple statistical tools addressing specific needs of a project. Critical to quality (CTQ) data points are identified, measured, and further addressed through the DMAIC roadmap. Six Sigma strives to get as close as possible to zero errors. Yet errors can be hard to avoid. To achieve Six Sigma quality, there must be no more than 3,4 Defects Per Million Opportunities (DPMO) – this standard is called World Class Performance (see Fig. 7). In other words, Six Sigma pursues the goal to produce 99,9996% of the time defect free products (Harry & Schroeder, 2000). This level of performance is impossible for knowledge-based non-automated business processes requiring human judgment (ex. Recruitment). However, in such processes Lean

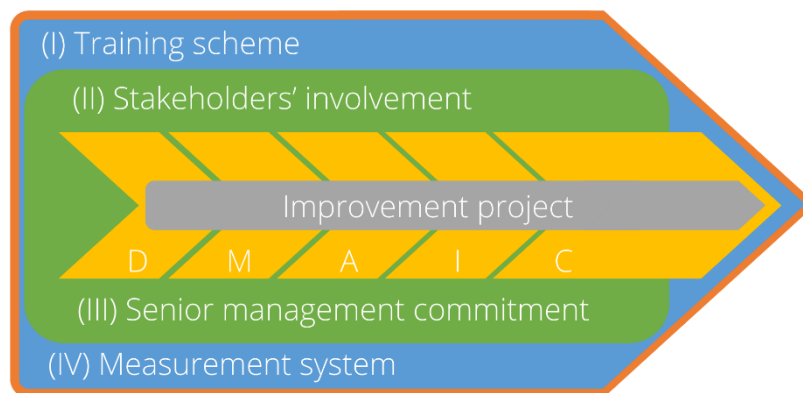


◆ Figure 7: Number of Defects per Million Opportunities (DPMO) stratified by sigma level (adopted from Chabukswar et. al., 2011)

Six Sigma provides improvements – save time, eliminate variability, reduce defects (Gershon, 2010).

### 3.1.1 Lean Six Sigma: infrastructure

Lean Six Sigma as a philosophy is adopted across the entire organization. Such comprehensive change requires developing internal infrastructure as an integral part of Lean Six Sigma projects. Four elements constitute Six Sigma Framework (Magnusson et al., 2009): (I) training scheme, (II) stakeholders' involvement, (III) senior management commitment, and (IV) measurement system (see Fig. 8).



◆ Figure 8: Four elements of Six Sigma with focus on an improvement project (adapted from Magnusson et. al., 2009)

#### (I) **Training scheme:**

To secure engagement of employees in the ongoing change, Six Sigma developed a Belt System reflecting different certification levels enabling training of employees in an organized way (see Fig. 9). Each level demonstrates the level of knowledge and experience of a person working with Six Sigma.

- *White Belts* are given to those who complete the introduction course in Six Sigma and grasp the philosophy and concepts of the methodology. These types of training introduce the

significance of the initiative and value which it can potentially provide. It is built to increase employee engagement and motivation to succeed.

- *Yellow Belts* are given to those employees who are identified as subject-matter experts and complete additional training. It allows a better understanding of project methodology and how a specific project will be conducted by the project leader.

- *Green Belts* are given to project leaders.

Green Belts have their regular job and responsibilities yet dedicate up to 20% of their work to the Six Sigma project they are running. They are leading the Yellow Belts through the process and are accountable for project development and results.

- *Black Belts* are project leaders, and they dedicate 100% of their working time to managing Six Sigma projects. In addition to running more complex or high profiled projects they also mentor Green Belts and share accountability for the projects' success.

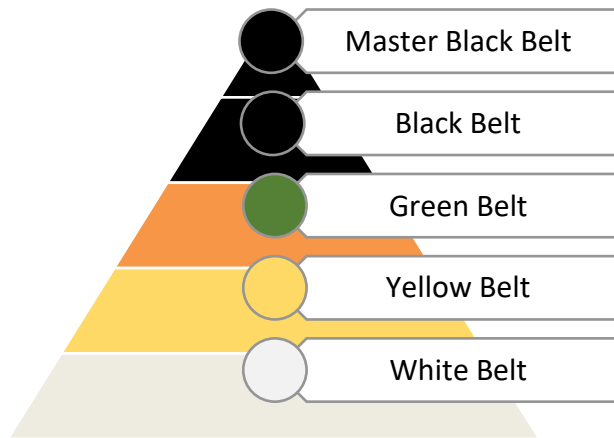
- *Master Black Belt* is a program Leader. Master Black Belts manage Black Belts and interact with the steering committee and manage the entire Six Sigma program within the company.

Within one organization there may be multiple ongoing process improvement projects going simultaneously. Recommended distribution in Six Sigma Organizations is: among every 100 employees – 20 Green Belts & 5 Black Belts. One Master Black Belt is recommended per 20 Blackbelts (Magnusson et al., 2009).

**(II) Stakeholder involvement** is an essential and highly effective Six Sigma attribute. Stakeholders set the direction of organizational strategy and set priorities.

**(III) Senior management commitment** is provided through a special training with the overview of the Six Sigma principles, tools, and methods of the DMAIC framework.

**(IV)** The process improvement in Lean Six Sigma projects is driven by data which is provided through a solid **Measurement System**. In the world of Lean Six Sigma a lot of



◆ Figure 9: Six Sigma Certification structure (Magnusson et. al., 2009)

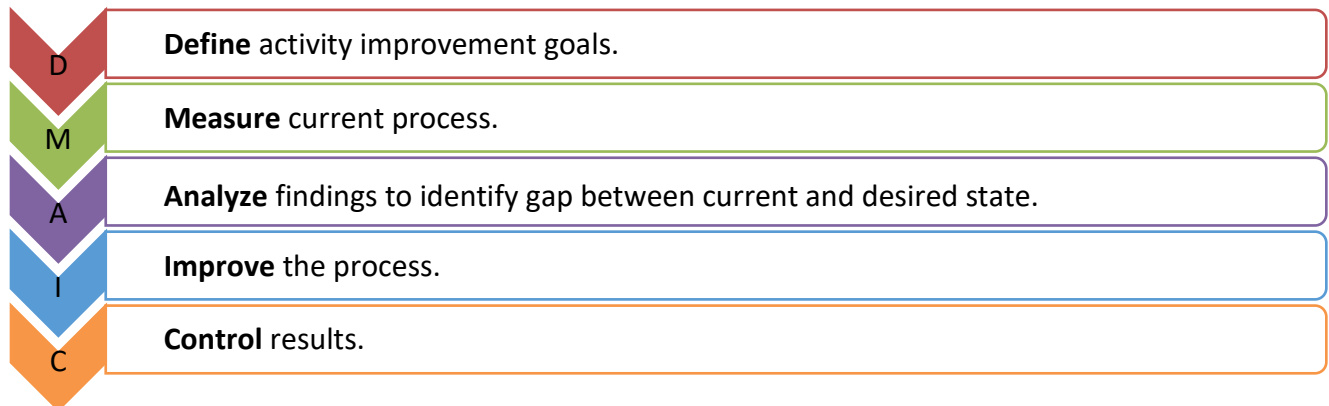
measurements of the processes are taken to calculate needed metrics. Lean Six Sigma provides a rich toolbox to collect data critical to quality and success of a given project.

When the entire required infrastructure is set up across the organization, training is provided, and process improvement projects are selected – the project implementation follows the DMAIC roadmap.

### 3.1.2 Lean Six Sigma: DMAIC

DMAIC stands for Define, Measure, Analyze, Improve, and Control (see Fig. 10). DMAIC is one of the most used methodologies in the world for process and quality improvement. It provides a structured flow and focuses on the improving of the existing processes in the organization. It is the backbone of Six Sigma where each phase has its specific objective and deliverables that need to be completed.

There are multiple tools available in Lean Six Sigma. DMAIC provides guidelines regarding relevant tools for each phase. Application of tools gives the expected deliverables. DMAIC provides guidelines, yet each project manager relies on own expertise and professional judgement when selecting a portfolio of tools for each specific project (Antony et al., 2016). Some tools may be from the original collection of Lean Six Sigma, yet additional tools and methods helping to achieve needed results within a specific project can be adopted and incorporated into the DMAIC roadmap (George, 2003). In addition, some tools may be reused in different phases (Antony et al., 2016).



◆ Figure 10: DMAIC model of Six Sigma (Adopted from Harry & Schroeder, 2000)



### **Define phase:**

In the **Define** phase the faced issues, improvement opportunities, and requirements in a process are being identified (Antony et al., 2016). During this stage, a process “as a whole” with its current challenges is being understood and the goals for a project are framed. In the Define phase the project team and project plan are being created. This stage helps to answer such questions as:

- What is the problem?
- How often does it happen?
- What is the impact of the problem?

Key outcomes of the **Define** phase.

Project needs are understood.  
Project mission is defined, and the project plan is created.  
Measurable objectives and goals are identified.  
Project team is formed.

### **Measure phase:**

In the **Measure** phase it is explored how the process is currently performed. During this stage it is being identified which metrics must be considered to measure the performance of a current, unaltered process (Antony et al., 2016). During this step, such questions are asked:

- How do we measure the problem?
- What data must be collected?
- How reliable is the data?
- And finally, what is the current process performance?

Key outcomes of the **Measure** phase.

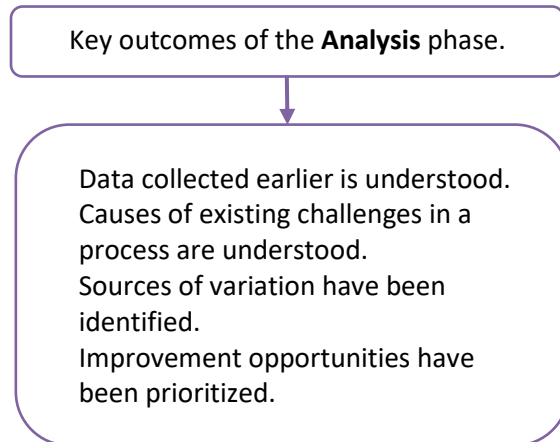
Process “as it is” is understood.  
Estimations about process costs are made.  
The raw data is collected.

The Measure phase is particularly important because it creates a baseline for the entire project. In the later stages the progress and results will be measured against these findings.

### **Analysis phase:**

In the **Analysis** phase the root causes and factors contributing within a process to a problem must be identified. Six Sigma suggests tools helping to look closer at the data collected earlier. An understanding about how the process works and what the data tells about the process becomes clearer at this stage (Antony et al., 2016). During this phase we can answer such questions:

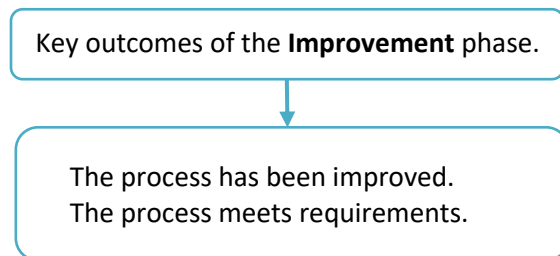
- What does the data talk about the process?
- Can we use data to verify that the root cause affects the process output?



### **Improvement phase:**

In the **Improvement** phase the key idea is to make changes in the business process and ensure that reasons for inefficiencies are addressed. The root causes are addressed and eliminated (Antony et al., 2016). Relevant questions for this phase would be:

- What are all the possible solutions?
- Which ones will work best?
- When, where, and how will we implement the solutions?



### **Control phase:**

During the final DMAIC step - the **Control** phase – the goal is to ensure that the newly developed process is stable and under control (Antony et al., 2016). In the Control phase the regular adjustments to control new processes and future performance are being made. The metrics are being monitored and results are being iteratively improved. During this phase, such questions are being asked:

- Has the project goal been achieved?
- Have the improvements become “a new norm”?

Key outcomes of the **Control** phase.

People who work with the process are being trained to work “in a new way”. The new process is being monitored and controlled against Critical to Quality (CTQ) metrics.

DMAIC is a roadmap to process improvement. It is a simple and logical approach to problem solving. And exactly this simplicity makes this tool so powerful enabling its application with different problems and environments (Antony et al., 2016; Magnusson et al., 2009). It is also important to note that DMAIC is an iterative approach (George, 2003). In addition, in real world stages may overlap a little and there may be movements back and forth as a project moves forward (Antony et al., 2016).

### **✔ Summary of the section**

The section Conceptual Framework provided a detailed description of the framework that is used in our study as an analytical lens. Also, the introduced conceptual framework limits the scope of the relevant data to our viewpoint in the analysis and interpretation stage.

#### **4. Research method and data collection**

This section describes the setting in which the study was conducted. In addition, we will talk about the methods used during the study, and how the data was collected. A very high-level overview of the research flow is as follows:

1. Understanding the business process to be improved within company Z.
2. Identifying existing process improvement methodologies.
3. Selecting Lean Six Sigma process improvement methodology for the task.
4. Designing and planning how the needed data is supposed to be collected.
5. Data collection (Stage 1).
6. Data collection (Stage 2).

Further in this section will be discussed more detailed the setting, approach, and other aspects of the research methods and data collection.

## 4.1. Research Setting

The study was conducted within company Z. The company was founded in 2014 and during 7 years of its existence grew significantly. The company currently holds around 60 employees across four offices in Gothenburg, Stockholm, Oslo, and London.

The product of the company is a SaaS platform. It is a tool that collects, and processes information related to employees' wellbeing and engagement within companies XYZ, which are customers of company Z. The tool collects employees' inputs about their subjective perception of such aspects as quality of leadership in their teams, team spirit, sense of purpose at work, stress level etc. This information helps to understand better the working environment, culture, and better manage human resources. The tool visualizes the corporate environment within a company in the form of index rates (see Image 2). Powered by AI, the tool tracks the dynamic and provides insights regarding possible outcomes helping companies to prevent escalation of negative patterns. The insights provided by the tool are mostly used by managers and leaders to realize their employee's needs, concerns, and motivation levels, thereby helping them to assess and improve the well-being of their organization.

Since its founding in 2014, the company has attracted many investors and has grown over the years. Since the pandemic started early 2020, the global demand for monitoring wellbeing and engagement level of remote employees increased exponentially. As a result, the company Z is recruiting more than ever to match the demand. The ambition of the company Z is to double in size during 2021 and become a company of more than 120 employees. Part of the challenge in this ambition is to have an effective and efficient recruitment process - and this is what we are concerned with.

Our study was carried out within the HR department of the company Z. Currently, the HR department consists of 3 people, where two of them are working with the recruitment process and one manager is working with onboarding and culture within company Z. Practically, the focus was on analyzing and identifying inefficiencies in any or all the steps of their recruitment process with the goal to come up with improvement suggestions, if any. Three HR Managers were our point of contact within the company.

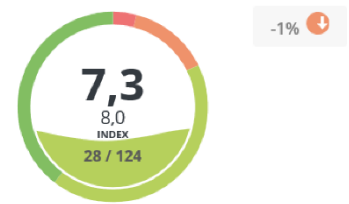


Image 2: Example of the team spirit index at company XYZ using the SaaS product of company Z.

## 4.2. Research Design

We approached the research design keeping in mind our primary question: *“How can we understand ‘quality’ in a recruitment process? How such quality can be achieved?”*.

Due to the multidimensionality of the question and complexity of the recruitment process, it was essential to look at it from different perspectives and collect qualitative and quantitative data about its numerous ingredients. (a) It made sense to collect numerical data related to KPI calculations to have measurable reference points for future analysis and identifying potential improvement opportunities in the recruitment process. (b) In addition, to make a link to the concept of cost-efficiency of different activities, understanding where time goes during the working hours was part of the essential insight. Finally, (c) the notion of quality is very subjective and contextual, so it was important to situate the notion in company Z.

There was no one simple way to collect information and data to cover the entire complexity of the given task. With the research goal in mind, the study was designed to collect and combine both qualitative and quantitative data to derive useful insights. We adopted the mixed case study approach to conduct our study. Mixed methods research is defined as “the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study” (Johnson & Onwuegbuzie, 2004). It was a conscious decision to use mixed methods research in our study because of its three main advantages, as suggested by Johnson & Onwuegbuzie (2004).

First, the narratives, words and pictures that constitute the qualitative part of the study can be used to add meaning to the numbers that constitute the quantitative part and vice-versa. A similar scenario exists in our study where the define phase and measure phase data complement each other in providing a coherent view of the process.

Second, it provides an opportunity to draw insights and understanding of the process, which might be missed when a single method is used. In our case also, collecting only qualitative or quantitative data alone would leave our study incomplete.

Third, choosing a mixed methods research means that the researcher has stronger evidence in hand for a conclusion, by combining the findings of the qualitative and quantitative data. It was exactly the need of our study, to draw useful conclusions about the recruitment process of company Z, identify inefficiencies in the process and suggest improvements.

The define phase of the data collection constituted the *qualitative* part of our mixed research, involving a study of the research setting and individuals within their natural setting. Virtual site visits, expert matter discussions and the company’s internal documents served as sources of qualitative data. SIPOC facilitated us in deciding what kind of data was needed from this stage and mapping all the data obtained to understand the recruitment process in place. Apparently, it turned out that this stage of the process was linked to the first part of our research question i.e., ‘How can we understand quality in firm recruitment process?’. All the sources of qualitative data are discussed in depth in 3.4.1.

The quantitative part of our mixed research was constituted by the measure phase of data collection and analysis, involving the numerical and statistical aspects. Online surveys, daily time and KPI logs served as sources of this data. This phase of data collection was associated with answering the second part of our research question i.e., ‘How can a quality recruitment process be achieved?’. All the sources of quantitative data are discussed in detail in 3.4.2.

### 4.3 Data-collection

After the Lean Six Sigma was selected as the analytical lens for the project, data collection was performed in two stages. Stage 1 was a link to designing Stage 2. The first stage pertained to the ‘Define’ phase of the DMAIC model and thus named after it as the Define phase data collection. The second stage of the data collection process pertaining to the ‘Measure’ phase of the DMAIC model was named the Measure phase data collection (see Table 2).

Stage 1: DEFINE	Stage 2: MEASURE
(1) Virtual site visits (2) Internal documents (3) Expert matter discussions	(1) Online surveys (2) Time Metrics (3) KPI Metrics (4) Virtual site visits

◇ Table 2: Data collection structure

#### 4.3.1. Stage 1: Define Phase

As this stage pertained to the Define stage of the chosen LSS process improvement methodology, the data collection process at this stage was framed in line with SIPOC with the intention of understanding the existing recruitment process at company Z, the

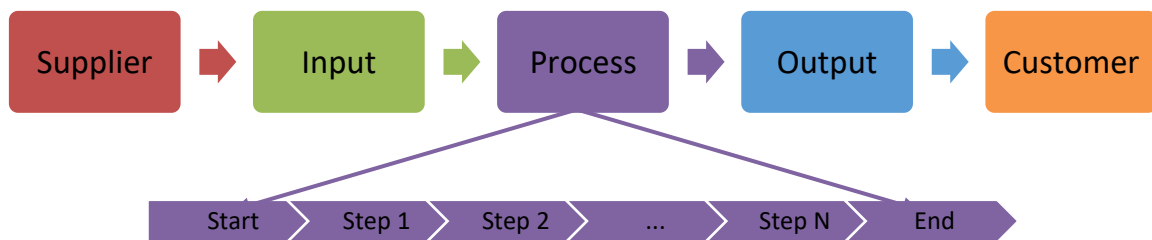
associated challenges, and interdependencies. Due to complexity of the project, during this stage, data collection was not a linear process, but rather an iterative one. It required us to move back and forth and collect pieces of information from different sources, which together formed a holistic picture.

### (1) SIPOC – Building an overview of the business process

The tool appeared in 1980th and was affiliated to TQM. Today SIPOC is used in Lean Six Sigma to create an overview of a business process (see Fig. 11). It stands for Suppliers, Inputs, Process, Outputs, Customers (Mandahawi et al., 2011).

The purpose of the SIPOC is to understand different actions within a work system. It helps to identify the overall process in a work system and provide an overall perspective without giving details about the process (Montgomery & Woodall, 2008). It suits well for defining, structuring, and scoping of business processes. SIPOC helps to highlight possible problems or weaknesses in the processes and visualizes how things are related to each other (George, 2003a). The procedure of creating a SIPOC diagram (Mandahawi et al., 2011):

1. Describe the Process from start to end.
2. Specify the quality Outputs.
3. Identify the Customers for the outputs.
4. Identify the needed Inputs.
5. Identify, who is the Supplier.



◆ Figure 11: SIPOC diagram framework (Adapted from Mandahawi et. al., 2011)

The SIPOC diagram helps answering such questions as (George, 2003a):

- What is the start and end point (scope) of the business process?



- What are the essential steps within the business process?
- What are the main inputs and outputs?
- Who are the customers (internal or external) of the process?
- Who are suppliers?
- What are the customer demands?

The first step of our study was to understand the existing recruitment process of company Z. Understanding the process started with its mapping – which is aligned with the SIPOC.

### **(2) Virtual site visits**

The existing pandemic situation had a huge impact on our study. The social distancing restrictions imposed by the government and the resulting remote working meant that we did not have an opportunity to visit the site physically. All our meetings and discussions with the HR unit at company Z had to be conducted virtually. A total of 4 such virtual site visits were conducted to understand various aspects of the issue in hand.

The discussions were built around their recruitment process, perception of its challenging aspects, and possible metrics which may serve as indicators of process performance. Some of the KPIs were identified as critical to the quality of the process and chosen to be calculated. Focused discussions were wired around the internal documents provided by the HR unit to get clarity on existing data.

### **(3) Internal documents**

Company Z provided PDF files, screenshots with data from their internal systems, and internal records to help us build a better overview of their recruitment process and aspects related to it.

### **(4) Expert matter discussions**

An External Quality Expert (Lean Six Sigma Black Belt) was involved to provide support and mentorship along the project. To align our work with the best existing Lean Six Sigma practices, mentorship was built around the tools, methods, and design of the project.

### 4.3.2. Stage 2: Measure Phase

As this stage pertained to the Measure phase of LSS, the data collection process in this stage was framed with the intention of measuring the various aspects of the existing recruitment process, which further guided us through the process of analysis. Online surveys, daily time and KPI logs, and virtual site visits were used for this purpose (see Table 2).

#### (1) Online surveys

To gather subjective views or in other words, what employees across the organization think about the various aspects of the existing recruitment process, we sent out a set of survey forms. Three online surveys were conducted to collect information and build a better understanding related to the recruitment process within company Z. Depending on the type of a survey, different groups of people were targeted to collect different perspectives on the topic. Data collected during surveys was anonymous to get more honest responses from participants. *Google Forms* were used as a tool for running the surveys.

- *Survey 1: Value & Quality Analysis*

The survey focused on each step of the recruitment process and asked participants to share their subjective perception of (1) importance of a step, (2) effort required to perform a step, and (3) how well a step is organized. This survey involved three groups of people: (1) representatives of the HR team, (2) top managers at company Z/Hiring managers, and (3) newly hired in company Z.

- *Survey 2: Assumptions & Estimates*

This survey was meant to collect information about subjective estimation of time spent at each stage of recruitment process and other activities performed within the HR unit. Opinions were asked from two groups of people: (1) representatives of the HR team, and (2) top managers at company Z/Hiring managers.

- *Survey 3: Candidate experience analysis*

This survey was conducted across newly hired individuals at company Z whose experience is still fresh. They were asked to rate their experience of different aspects of each step of

the recruitment process like quality of administration, clarity of instructions, and quality of communication.

## (2) Time Metrics

With the selected case study at company Z, time metric was identified as one of the building blocks for the recruitment process analysis. Data about time spent for different activities during the day by the recruitment team was collected through the *Data-Collection app* (see section Data-Collection app).

It is paramount to know where time goes. The goal with time metrics is to understand how the time is spent and what can be improved. Time tracking allows us to challenge and double-check the decisions related to business process flow and management. Time metrics demonstrate patterns which may be leveraged. Tracking time helps to identify time drains, lengthy processes, bottlenecks, unproductive patterns, low value tasks. Tracking time and timing retrospectives allow us to learn from past decisions and add clarity regarding what to improve.

Time metrics were incorporated into some chosen KPIs for process improvement. “Time is money” (Franklin, 1785) - knowing where the time goes enables us to assess cost-efficiency of activities in a business process and helps to stick to priorities. Understanding time spent allows better task management and time management across the process. It provides insights regarding which parts require closer attention. It enables forecasts and better planning of processes of the future. Insights about timing in business processes enable effective and positive change.

## (3) KPI metrics

During the Define phase of data collection, together with the HR team from the company Z and under support of the Quality Assurance Expert a set of KPIs were identified as critical to the recruitment process performance. Considering the multiple dimensions of the recruitment process, diverse data is needed to calculate selected KPIs. Some data was readily available, some data was possible to extract from *internal documents*, while some



Image 3: “Time is money” Illustration from [Vectorstock](#)

data had to be collected additionally through *Google Forms* and *Data-Collection app* (see section Data-Collection app). Some KPIs were named as interesting yet it was not clear if it would be possible to calculate them considering such limitations of the circumstances as duration of the project, not enough data etc. The list of selected KPIs was identified as following:

- % of targets met
- Interviews per hire
- Offer acceptance ratio
- Cost per Hire
- Source of hiring candidates

#### **(4) Virtual site visits**

To summarize the whole set of collected data from the Define and Measure phase and reflect on some of the aspects of completed work, team discussions during virtual site visits took place. Additional nuances related to the recruitment process and ways of work were addressed and taken into consideration before the data analysis phase started.

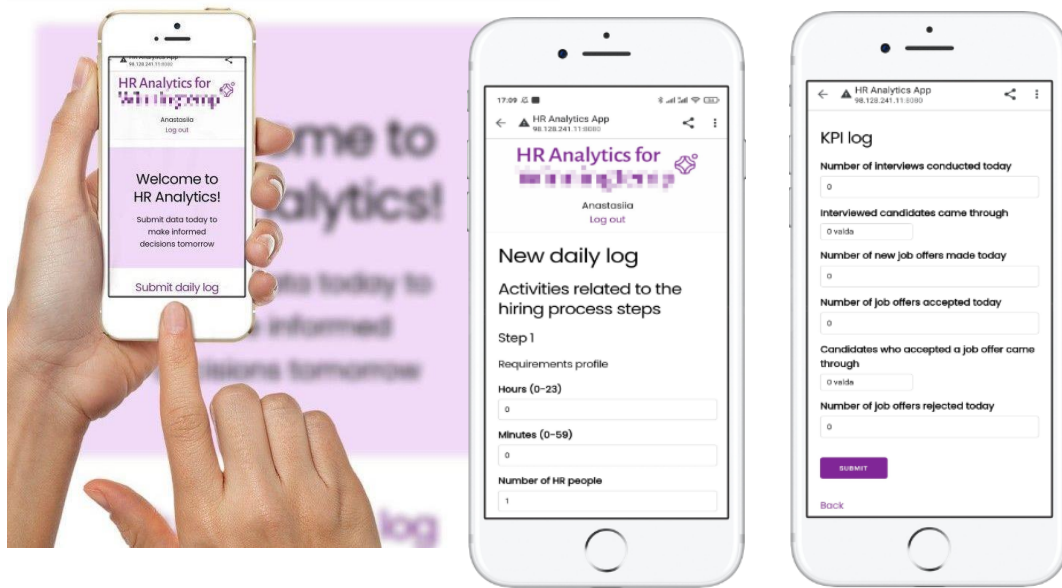
#### **➤ Data-Collection app**

To collect data needed for in-depth analysis of the recruitment process at company Z, an app customized for the purposes of the project was developed (See Image 4). The app represents a digital log system recording time on respective activities during a working day (time logs), and an additional section which collects insights into other areas of business process (KPI logs). The app was designed based on the findings from the Stage 1 and reflected the needs of the company Z.

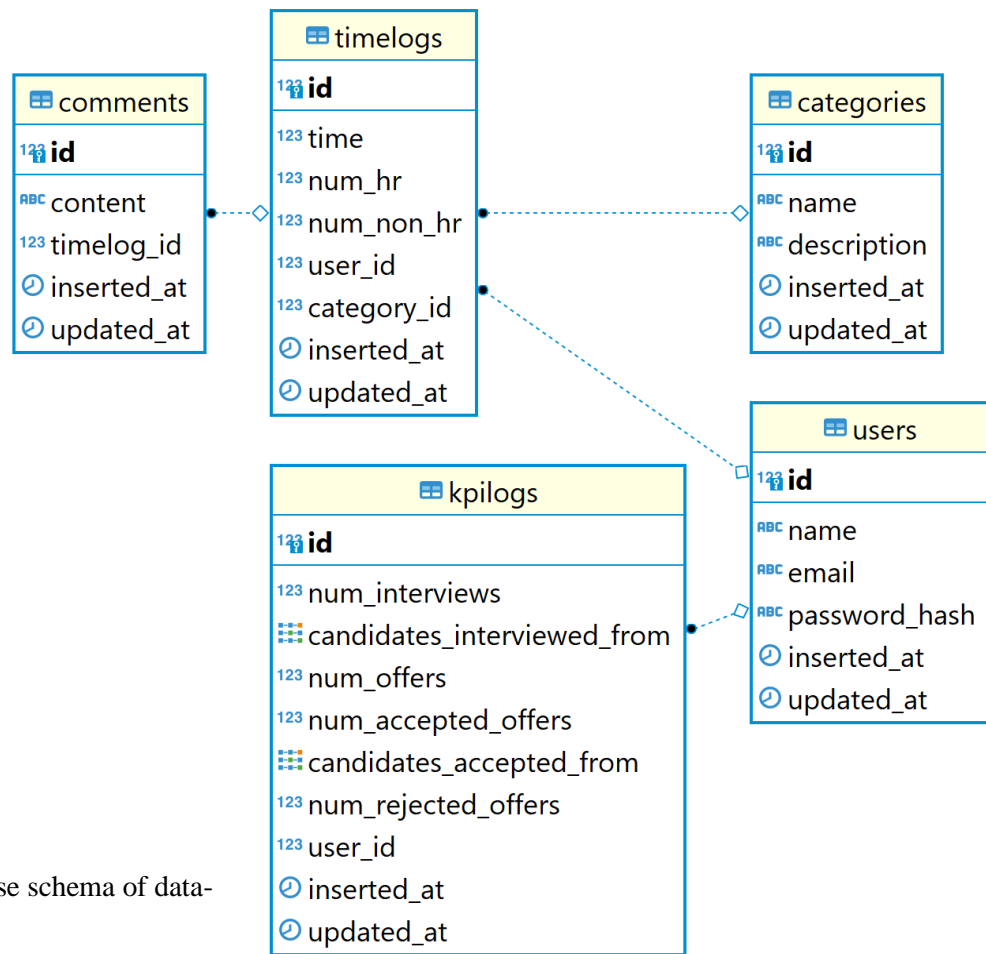
The app is a web application which can be accessed via a browser. It was designed to be responsive, allowing for smooth user experience on both desktop and mobile devices. Each user submitting the data had access to the app via his/her personal account inside the app. When logged in, the user could submit a daily activity log by filling out a form.

The backend of the application was deployed on a Raspberry Pi 4B single-board computer running a headless (no graphical user interface) Linux environment. All the data submitted, as well as the list of users and their account info, was stored in a PostgreSQL

database on the same Raspberry Pi 4B device (see database schema in Image 5). The web server responding to user requests and writing data into the database was written in [Elixir language](#), which is a strongly typed dynamic programming language running on an Erlang virtual machine. The front-end of the web application was server-side rendered using [Phoenix framework](#), while the connection to the PostgreSQL database was provided to Elixir via the [Ecto library](#).



⊗ Image 4: Screenshots of data-collection app (\*Name of the company is blurred for anonymity)



#### 4.4. Data

Image 5: Database schema of data-collection app

The

data analysis was guided by the LSS theoretical framework and linked to the Analyze phase of the DMAIC process map. A convergent design of research consists of three phases of data analysis. *The first phase* consists of analyzing the qualitative data by coding and collapsing the codes into broad themes. Analyzing the quantitative data in terms of statistical results comprises *the second phase*. *Third phase* comprises the mixed data analysis that consists of integrating the two databases. A side-by-side comparison approach is one way of merging the qualitative and quantitative results, where the researcher reports one form of database and then compares them with the other form (Creswell & Creswell, 2018). A similar side-by-side comparison approach was used in our case to merge the qualitative and quantitative data and draw useful insights.

The qualitative Define phase data gathered from internal documents was read several times attentively to understand different aspects of the recruitment process in place and to identify parameters that could be considered for further analysis and improvement. Combining the various

identified aspects and parameters with the outcome of a series of informal discussions with the concerned HR personnel of the company during virtual site visits furthered our understanding.

The next step was the statistical analysis of quantitative measure phase data that were gathered in the form of surveys and time & KPI logs. Excel sheets for the statistical data that were obtained were created, with an intention of creating visual graphs and comparison tables of the responses. The results of surveys and logs were then analyzed in iterations, going back and forth.

The qualitative and quantitative data results were then merged to derive insights that could guide the purpose of study.

### ✔ Summary of the section

The section Research Methods and Data collection tried to communicate how we chose our methods and how we collected data for the scope of the project. We were trying to collect pieces of information and connect dots to build the big picture required for further analysis. Identifying the path was an agile and iterative process with multiple steps and different data collection channels. The whole process consisted of Stage 1 (Define) and Stage 2 (Measure). Stage 1 was the link to Stage 2.

Data-collection was designed to make sure that the data we gather will help us to draw the insights needed to answer our research question: *How can we understand 'quality' in a recruitment process? How such quality can be achieved?*". In order to build a coherent picture, both primary and secondary data were collected. It was important to keep in mind both practical aspects of the project (the business process analysis and potential improvement opportunities of the recruitment process at company Z), as well as its academic context where the chosen methodology is appropriate in relation to the research problem.

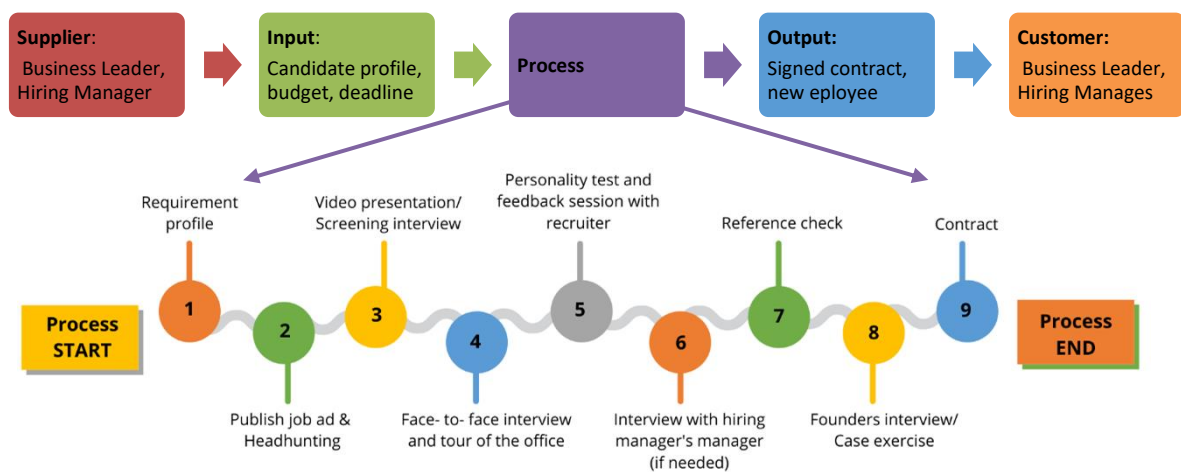
## 5. Results and findings

The results of our data analysis will be presented in three sub-sections. We will begin with presenting section 4.1. *Results of the Define stage* followed by the section 4.2. *Results of the Measure stage*. They both reflect findings from the respective data-collection phases described earlier. In the last subsection 4.3. *Key takeaways from the Define and Measure phases (Analysis)* will be presented with the merged insights from both phases.

### 5.1. Results of the Define stage

The first step in our data collection process was to dive deeper and understand the existing recruitment process within company Z. Our informal discussions with the HR managers during the virtual site visits in combination with the documents provided by them guided us in mapping the process in line with the SIPOC framework as presented in Figure 11.

SIPOC analysis helped to identify boundaries and scope for the project. Having the recruitment process at company Z in focus of our attention, we mapped the process steps and identified Suppliers and Customers of the process (see Fig. 12). As recruitment is a supportive function within company Z, both Suppliers and Customers of the process are internal to the company. In addition, on a high level we clarified Inputs (requirements for the process beginning) and Outputs (results) of the recruitment process. Recruitment process in company Z consists of 9 steps (see Table 3).



◆ Figure 12: SIPOC analysis results



<b>Step</b>	<b>Name of the Step</b>	<b>Activities related to the steps</b>
<b>1</b>	Requirement profile formulation	<ul style="list-style-type: none"> <li>HR managers along with hiring managers draft the expected qualification and characteristics from a candidate needed to succeed in a particular open position.</li> </ul>
<b>2</b>	Publish Job Ad & Headhunting	<ul style="list-style-type: none"> <li>Publishing of the final job advertisement through selected channels</li> <li>Headhunting (inhouse and through outsourcing)</li> </ul>
<b>3</b>	Video Presentation/Screening Interview	<ul style="list-style-type: none"> <li>Screening and filtering candidates through submitted videos using a video recruitment tool OR Organizing and conducting screening interviews</li> </ul>
<b>4</b>	Face-to-face interview & tour of office	<ul style="list-style-type: none"> <li>Organizing and conducting in-depth face-to-face interviews (Tour-office skipped due to Covid-19)</li> </ul>
<b>5</b>	Personality Test	<ul style="list-style-type: none"> <li>Invitations sent out to short listed candidates for personality test.</li> <li>Organizing and conducting feedback session</li> </ul>
<b>6</b>	Interview with hiring manager	<ul style="list-style-type: none"> <li>In some occasions, organizing and conducting an interview between a candidate and a hiring manager</li> </ul>
<b>7</b>	Reference Check	<ul style="list-style-type: none"> <li>Organizing and performing reference-check procedure</li> </ul>
<b>8</b>	Founders' Interview/Case interview	<ul style="list-style-type: none"> <li>The HR team schedules an interview of the candidate with one of the founders OR Organizes and performs a case-interview</li> </ul>
<b>9</b>	Contract	<ul style="list-style-type: none"> <li>Contract preparation and signing.</li> </ul>

◇ Table 3: Recruitment process steps at company Z

There are possible fluctuations in formats of each step depending on position which must be filled (ex. Interview with founders or case exercises; pre-recorded video presentation or live screening interview, cases for case-interviews depend on the position etc.), yet the flow and high-level pattern are meant to be maintained.

SIPOC process map enables grasping the complexity and interdependencies of the workflow. During the SIPOC the key activities of the business process were understood and named. Clarity in understanding the project scope with integral steps of the recruitment process at company Z allowed us to identify how the process can be further studied and which data had to be collected for understanding the potential process improvement opportunities within company Z.

## 5.2. Results of the Measure stage

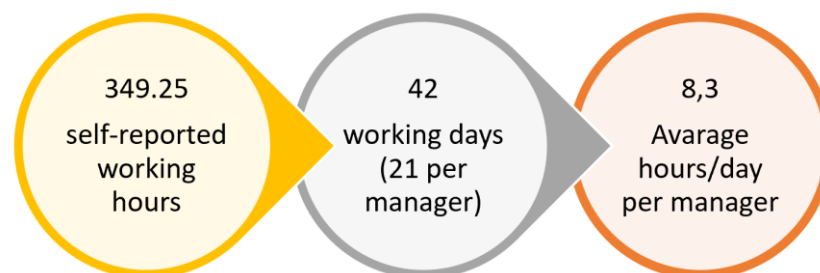
During the Measure phase different sets of data were collected to support our analysis of the recruitment process at company Z. As described in the previous section in details, the data was collected through different channels:

- *Time Logs*: automated log system where HR managers self-reported their activities during the day and time spent on them.
- *Online surveys* of several different target groups allowing to grasp more insights relevant for recruitment process analysis.
- *KPI logs*: automated log system where HR managers reported data needed to calculate selected KPIs.

### 5.2.1. Results from Time Logs

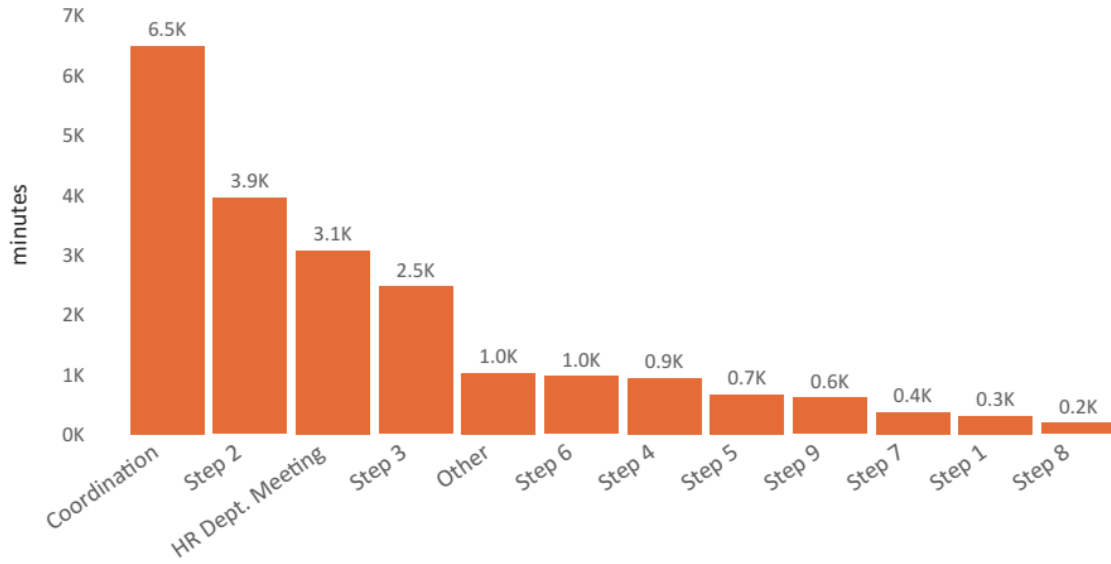
As described in section 3.4.3, time tracking was an important aspect of our study because analyzing where time goes provides us answers for multiple management questions and questions pertaining to the cost of the process. The time logs provided by two HR managers over a period of five weeks played an important role in shaping our insights and further analysis.

The total submitted time is 20 955 minutes = 349.25 hours. This is a self-reported working time by two HR managers responsible for the recruitment process at the company Z during the 5 weeks period between March 7, 2021 and April, 9, 2021. In total the number of submissions were 42, reflecting the number of working days per two HR managers during the data-collection time. This information revealed that on average it is required 8,3 working hours per working day per manager (see Fig. 13).

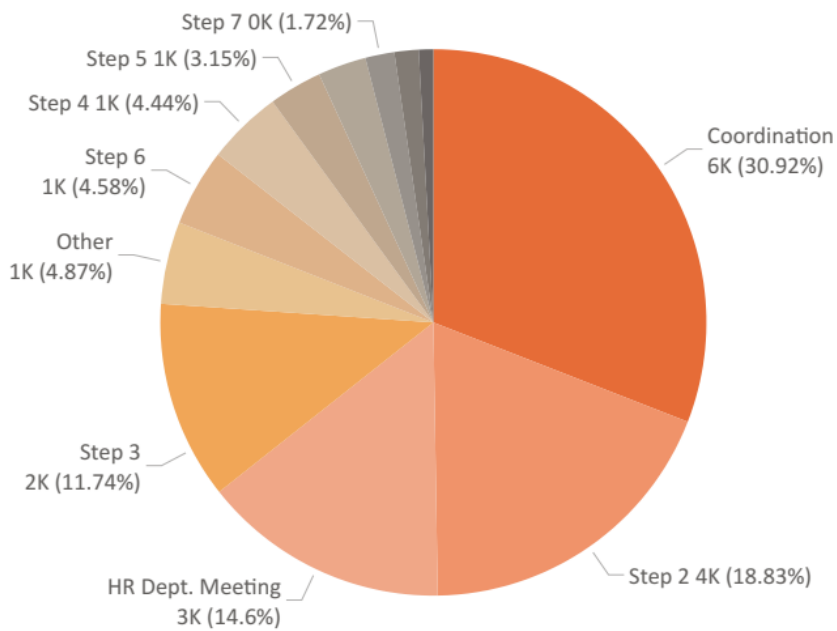


◆ Figure 13: Time Logs overview

The distribution of the working time spent on different activities by categories is represented in Figure 14, while the proportional distribution of the same data is represented in Figure 15.



◆ Figure 14: Distribution time spent by HR managers on work-related activities



◆ Figure 15: Proportional distribution of total working time spent by HR managers on work-related activities

Interestingly, it was seen from the logs that 75,1%, or 3/4 of the entire working time of the managers are taken by four activities (see Fig. 15): (1) Coordination, (2) Publishing Job Ad and Headhunting (Step 2 of the recruitment process), (3) Department team meetings and (4) Screening interviews.

(1) More than 30% of time the two HR personnel responsible for recruitment spent not into any of the steps of the recruitment process itself, but into the act of coordination of multiple activities (see Fig. 15).

(2) Step 2 of the recruitment, Publishing Job ad and Headhunting, was in the next place and consumed 18.8% of the working time of the HR managers (See Fig. 15) – the most time-consuming step in the recruitment process of company Z.

(3) The HR department meetings also consumed a considerable amount of 14.6% of the time, followed by (4) screening interviews at 11.7%.

Compared to these activities, all the other steps took substantially less time requiring 24,9 % of working time altogether.

### **5.2.2. Results from Survey Forms**

Online survey through google forms was sent out with an aim of gathering information about how employees in different positions within the company Z perceived different aspects of these steps. See in *Appendix 1* the adapted for paper format survey *Value & Quality Analysis* conducted in Google-form. The three themes assessed were (1) the importance of each step, (2) effort required for each step and (3) how well each step was organized. Ten participants of the survey (1 HR manager, 3 hiring managers/top management, 6 newly hired candidates) expressed their views. The goal was to understand subjective assumptions existing in the minds of people as they consequently affect actions and decisions in the real world.

The result of the survey is homogeneous. The survey by itself reveals that all three aspects of all the nine steps in the recruitment process in company Z are rated very high by all the participants.

- (1) All the steps seem relatively equally important – the average result is 8.1/10 where 10 is a *very important step*.
- (2) All the steps seem relatively easy to be followed – 3.9/10 where 10 is a *step requiring a lot of effort*.
- (3) And all the steps are well organized – 7.9/10 where 10 is *perfectly organized*.

The isolated information from this survey may not reveal any significant insights unless put into the context with the other information, which will be done in the section 5.3.

Paying closer attention to the Step 2 (Posting job add and headhunting) which takes most of the time of managers in company Z from the whole recruitment process (see Fig. 15), it was interesting to notice that Hiring managers and Founders believe that the effort required for this step is 3/10 (very low effort, even lower than average across the entire recruitment process), and they also believe that this step is organized better than any other steps ranking them 9.5/10. In addition, a HR manager also ranked 8/10 the aspect of how well the Step 2 is organized.

The number of participants in two other surveys planned, *Assumptions & Estimates* and *Candidate experience analysis* (see Appendix 2 & 3 respectively), was not enough for analysis and insights.

### **5.2.3. Results from KPI Logs**

Identifying and defining KPIs in relation to the goal of our study was the best way of measuring the performance of the recruitment process. Our findings from the data logs related to the identified KPIs as described in section 3.4.3. are as below.

#### **1. KPI: Interviews per hire**

This KPI indicates *the number of interviews conducted by a hiring team to fill an open position*. It has a direct impact on cost per hire as a poor interview to offer ratio

dramatically increases the cost associated with each hire. The interviews per hire KPI also have an impact on candidate experience and the employer brand.

The results of the data logs associated with this KPI are shown in Figure 16. It was reported that during the five-week data collection phase, a total of 53 interviews were conducted for various open positions and a total of 7 job offers were made. This means that approximately 8 ( $53/7=7.57$ ) interviews were conducted per hire.



◆ Figure 16: Number of Interviews and Hires during the study period.

## 2. KPI: Offer acceptance ratio

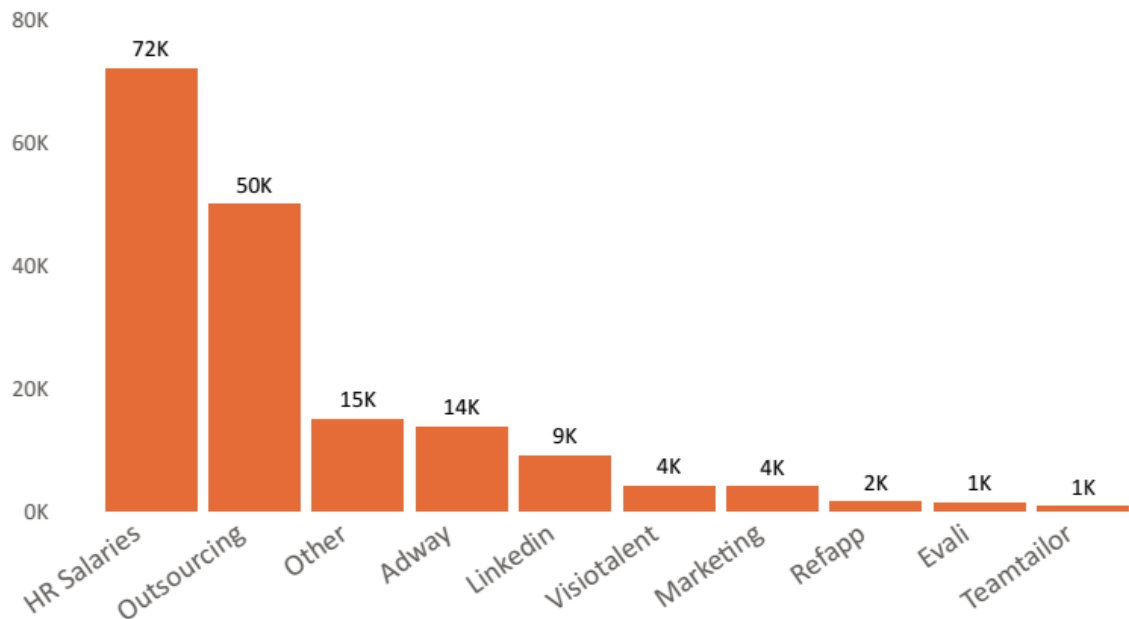
*It is the ratio of the number of offers made by company Z to the number of accepted offers by their potential candidates. A poor acceptance ratio, when candidates don't accept offers, acts as an indicator of various aspects like the quality of the recruitment process, candidate experience, the fairness of the salary offers made to shortlisted candidates etc. It was seen from the data logs that all the candidates, 7/7, who were made an offer by the company Z, accepted it. Meaning that the acceptance ratio was 100%.*

## 3. KPI: Cost per hire

*Cost per hire is the average expense associated with attracting, screening, and hiring a candidate for a single open position. An above average value of this KPI is typically associated with every aspect of the recruitment process like poorly written job descriptions, ineffective candidate screening, poor allocation of resources for various steps of the hiring process. Overall, an abnormal cost per hire KPI shows signs of an inefficiency and ineffective recruitment process.*

From the data provided by the company Z, the sum of all the expenses related to the recruitment process at company Z constitutes 156 708 Kroner per month. The distribution of expenses across categories may be found in Figure 17 and clarification about

function of each category in Table 4. The data-collection round lasted for 5 weeks resulted in 7 hires in the company Z. Rounding off 5 weeks to 1 month for the ease of calculation, we come to the number  $156\,708/7 = 22387$  Kroner (KPI Cost per hire).

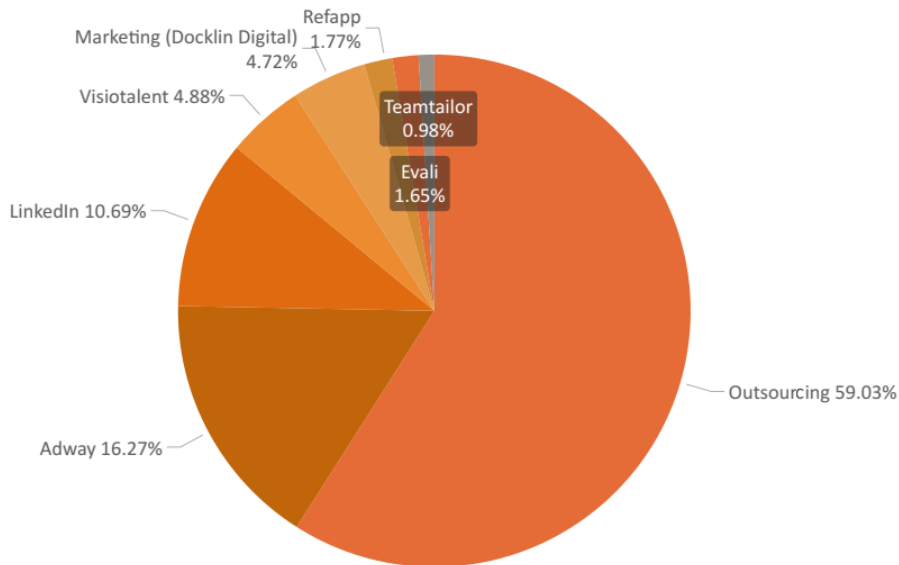


◆ Figure 17: Expenses related to the recruitment process at company Z per month

Category	Explanation
Salaries of Managers	Two full time managers performing duties
Outsourcing expenses	Payment to external third-party provider of headhunting services
Other	Unspecified
Adway	Digital social media marketing tool
LinkedIn	LinkedIn for the recruiter account
Visiotalent	Tool for collecting pre-recorded video interviews
Marketing	Paid marketing campaigns online on platforms like Indeed, Facebook, Glassdoor etc.
Refapp	Tool for collecting digital references about candidates
Evali	Personality test tool

Teamtailor	Applicant tracking system (ATS)
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◇ Table 4: Categories of expenses related to the recruitment process at company Z



◆ Figure 18: Distribution of expenses related to the recruitment process at company Z per month (without salaries of managers)

Interestingly, aside from salaries, more than 50% of the total expenses go to outsourcing the head-hunting process (see Fig. 18). Moreover, it is seen in this chart that, aside from salaries, Outsourcing combined with expenses on using Adway, which are linked to marketing and headhunting, comprise 75,3% of costs.

#### 4. KPI: Source of hired candidates

This is yet another important KPI as it can be useful to determine how many (1) external candidates apply online for announced positions, how many candidates are (2) headhunted, and how many (3) got into the recruitment process through internal reference. With the decent amount of data, this retrospective information put into the broader context of an analyzed recruitment process helps in a mindful allotment of recruiting hours and resources for maximizing return on investment (ROI).



According to the data provided by company Z through daily log submissions, during the 5-week data-collection round 3/7 candidates hired were external applicants, while 4/7 hired were referenced internally. None of the newly recruited was selected from headhunting (neither internally conducted, nor externally).

More detailed information regarding the source of external applicants tracking where they come from (ex. LinkedIn, Arbetsförmedlingen, Indeed etc.) as well as data-pool for a longer period of time than the 5-week data-collection round can be potentially collected through the ATS Teamtailor, yet due to confidentiality policies and contextual peculiarities of the project, it was impossible to gather more information for more thorough analysis of the KPI Source of hired candidates.

## **5. KPI: % of targets met**

*KPI % of targets met* provides insight into the ratio of actual hires to hiring goals for a particular period. This is an indicator of how the recruiting process functions within a company. Unsatisfactory values of this KPI indicates that there is a faulty process in place and that it needs to be reviewed for the well-being of the company. According to the data provided by the company Z, 37 positions were intended to be hired during January-April 2021. Out of 37 positions initially requested, 4 have been paused by the responsible manager, while the rest 33 were successfully filled signaling that the firm was doing exceptionally good in reaching the hiring targets. They met their target 100%.

### **5.3. Key takeaways from the Define and Measure phases (Analysis)**

This subsection is aligned with the Analysis stage of the DMAIC methodology, where we combine the results of define phase and measure phase data to gain coherent insights about the recruitment process at company Z. It is clear from section 4.1 that the company has well defined steps of the recruitment process. However, its deeper analysis suggests significant improvement opportunities in three prominent areas: (1) Coordination, (2) Cost efficiency, (3) Insight.

**(1) Coordination:** It was a surprising insight to see how much time is spent for coordination – 31% of the entire working time (See Fig. 15). According to lean philosophy, any action not creating direct value to the process needs to be reduced or eliminated. In this sense, it

becomes important to understand the kind of value ‘coordination’ adds to the process. If streamlined, time required for coordination may be reduced significantly, freeing resources (both time and intellectual resources of managers) for more value-adding activities.

**(2) Cost efficiency:** Analyzing the relation between (1) *Cost of Hire* KPI, and (2) Time Logs gives insights into possible improvement opportunities with budget allocation within the recruitment process at company Z. Elements directly affecting the *Cost of Hire* KPI such as Outsourcing and Adway comprise 75,3% of total costs aside from salaries of managers. These investments are directly linked to the Step 2 of the recruitment process (Job Ad and Headhunting) and are supposed to facilitate the workflow of managers. Yet, the Return on Investment (ROI) of allocating resources into these channels evokes critical reflection when put into context of insights collected from Time Logs. Managers spend 18.9% of their working time for job advertisements and headhunting despite the discussed above financial investments. The data shows that for the company Z *Headhunting is a costly activity both budget and timewise*, however during the 5-week data collection round none of the hired candidates actually came through headhunting. On top of it, looking at the *Source of Hired Candidates* KPI it is seen that the majority, 4/7 candidates, came through internal references which do not require neither financial expenses nor time investments from HR managers. These findings may be a strong incentive for re-evaluating the cost-efficiency of the recruitment process in the company Z.

**(3) Insight:** the data extracted from the surveys provides subjective perception of such aspects of the recruitment process at company Z as (1) the importance of each step, (2) effort required for each step and (3) how well each step was organized. When the expressed assumptions and subjective opinions are put into context and linked to the actual data-driven insights gained through Time Logs and KPIs like *Source of Hired Candidates* and *Cost per Hire*, it becomes clear that answers of Founders and Hiring managers are completely misaligned with actual insights driven after data collection and analysis. The survey analysis suggests that Hiring managers and Founders dramatically underestimate the (2) effort required for the Step 2, ranking it 3/10, and extremely overestimate (3) how well the step is actually organized grading it 9.5/10. On top of it, even the HR manager working directly with the recruitment process, gives grade 8/10 when reflecting on how organized the Step 2 feels. When put into context of discussed earlier findings

regarding highly sub-optimal cost-efficiency decisions and coordination challenges, it becomes apparent that the subjective perception is not reflecting reality.

### ✔ **Summary of the section**

The section covered findings and insights in three subsections. (1) To communicate the findings from the Define stage, the recruitment process map at the company Z resulting from the SIPOC analysis was presented. (2) Further, findings from surveys, Time Logs and KPI Logs were introduced as results from the Measure phase. (3) The last subsection brought up the three key takeaways resulting from the Analysis part of the DMAIC framework: Coordination, Cost efficiency and Insights.

## 6. Discussion

The research question posed for the current thesis was *How can we understand 'quality' in a recruitment process? How such quality can be achieved?*”.

Contemplating the first part of the question *How can we understand 'quality' in a recruitment process?*, through our findings it becomes prominent that both Human Resources (HR) as well as the ability to manage HR play a strategic role in the capacity of a company to gain and maintain its competitive advantage. Resource Based Theory stresses the importance of leveraging strategic resources, while leveraging HR does not happen automatically and requires relevant attention and different techniques. HR professionals, understanding the importance, put a lot of emphasis on the recruitment process of employees. To ensure the right fit into the existing environment of a company, recruitment becomes a very important process. Moreover, nothing exists in isolation, so the complexity of the external world adds additional practical challenges that make recruitment even more difficult and resource consuming. *As such, we concluded that the meaning of a quality recruitment process is that it enables, despite all the challenges of internal and external environments, to meet the HR needs with the least resources spent.*

*How can it be achieved* is the second focus of our research and in this context Lean Six Sigma (LSS) came into the radar in our investigation. Originated in industry, LSS has a reputation of a tool applied in production lines for quality assurance. Only relatively recently the application of LSS was expanded to other types of business processes, yet its implication and effectiveness in HR, and recruitment, is still in the bud stage. During the application of LSS for our research, we found a significant value in the DMAIC roadmap which enabled clarity in our thinking and, as a result, project flow. In addition, being so modular and flexible, Lean Six Sigma provides enormous opportunities for different contexts. The peculiarity of LSS is that it is a statistical method tightly linked to preciseness of measurements during the Measure phase. Exactly this fact was one of our concerns in the initial stages of the project. The measurements which we were able to make during the project were heavily dependent on self-reports of the involved actors, - which is very far from the accuracy of measurements from an industrial production line. However, despite being so imprecise, the insights gained through the collected data enabled us to identify significant improvement opportunities for the recruitment business process at company Z - both operationally and financially.

## **LSS and recruitment business process analysis**

Usually, this type of studies that we performed in company Z happens in academia for research purposes, yet in industry, especially in recruitment, it is not that common. However, our case showed that it is very reasonable to make this type of research because it may pinpoint and clearly highlight significant improvement opportunities. LSS enables answering such questions as “What percentage of processes really add value?” or “What activities can be made more efficient?”. These simple questions may result in uncomfortable answers, yet at the same moment become a powerful incentive to make responsible next steps towards quality-assurance and process re-consideration. An in-depth business process analysis with LSS helps to see what is impossible to see otherwise.

### **The notion of quality**

One topic which was a source of recurring discussions during the project was the notion of quality. What is “quality”? What is a “quality candidate”? What is a “quality recruitment process”? It was apparent that quality was contextual, yet we noticed the tension appearing when the notion of quality was addressed and drifted from one area to another. In simple words, long recruitment becomes an expensive recruitment, yet how can we know that it is directly linked to “good quality candidates”? A shorter recruitment may affect the quality of candidates, but does a short recruitment necessarily mean “bad quality candidates”? The inherent conflict in the notion of quality may trigger emotional speculative discussions without clear consensus. The best way to make such speculative dialogue constructive is to translate its ingredients into numbers and be more data-driven.

### **Role of technologies**

Speaking about constructive and data-driven approaches, digital technologies come into play. Needless to say, that technologies become an integral part of the modern workflow. During the pandemic time when our research was conducted, 100% of work happened remotely which by default presumes relevant technical infrastructure enabling the flow of work per se. On the one hand, it is still fascinating how technologies enable and fuel the transformation of working space and norms. Cloud becomes the full-time modern working environment. While on the other hand,

analyzing the collection of software in use by the HR team to enable their work and coordinate the recruitment process, there is a strong impression that nowadays companies take the role of software integrators in their efforts to incorporate different pieces of software into their workflow. There is a separate piece of software for many different actions - from simple daily communication to checking references, marketing campaigns, and tracking applicants. It's impressive how diverse the selection of available tools is, yet on the other hand exactly this variety results in fragmentation of information and lack of holistic view which complicates analytics and drawing insights.

This fragmentation of information and lack of integrity in available data needed for holistic analysis of the recruitment business process at company Z, inspired us to design an app which incorporated in its functionality aspects enabling us to collect the missing pieces of information. The app was designed and customized according to the needs of this specific project and provided us with the possibility to collect time-logs about time spent for different activities, as well as missing pieces needed to calculate selected KPIs. This app helped us to connect dots and bridge needed gaps in the business process analysis. The app is not an “end all be all” solution, but a tool for collecting missing pieces of information in a specific context.

Reflecting on this experiment with the app, we conclude that it may have very promising implications in the future. First, being easily customizable and user-friendly, to collect those pieces of information that will be missing in other in-depth business process analysis, it can be adapted for other similar projects. Secondly, this app may be in use with the same team even after the initial analysis is done to measure and keep track of improvements - Improve and Control phases of the DMAIC methodology. The app does not take more than 3-5 minutes per day per person to make daily logs with the requested data. However, the consistency of data inputs enables tracking the dynamics and improvements over time, allowing retrospectives, holistic analytics, and truly data-driven way of work. Data-driven way of work is a smart way of work as it takes away subjective judgements and leaves numbers - leading to rational and optimal decisions.

### **Practical recommendations**

So, what does our study deliver to company Z? It is seen from our findings that though company Z has a well-defined step-by-step recruitment process, the whole process itself is not

very well organized. The key takeaways from our findings (see section 4.3) suggest possible improvement opportunities in such aspects as *coordination, cost-efficiency, and insight*.

***In the context of coordination***, Return on Investment (ROI) of time will be discussed. It is seen from the time logs that maximum time (30.9% of the total working hours, see Fig. 15) of the HR managers goes into coordinating and orchestrating several aspects of the recruitment process, and not much into the process itself. Such things as coordination of internal meetings, as well as scheduling interviews with candidates currently takes a substantial piece of working time. One of the organizational modifications for this operational challenge would be planning prescheduled timeslots for respective activities. Of course, it is impossible to foresee all the meetings which may be needed, there should be left room for spontaneous activities and flexibility. However, a substantial chunk of meetings may be planned in advance. If not concrete meetings, then timeslots for different types of activities requiring synchronization, like interviews. Another one suggested modification would be automation of booking of these available time slots. Modern technologies enable automation of appointments scheduling and syncing activities across multiple calendars. Forewords and follow-ups may be automated as well. To sum up, pre-planning and automation of meeting planning will minimize time and effort required for coordination, making the process less hectic and more cost-efficient.

***In the context of cost-efficiency***, financial ROI is discussed. We will begin with discussing financial ROI on multiple pieces of software. The more paid programs are in use - the more total expenses are required. In addition, when managers must switch between different working programs, this, assumingly, contributes to complexities with coordination of the entire workflow discussed above. In the ideal world there should be one integral and holistic digital product that would incorporate all the needs associated with the recruitment process. This would eliminate “switching time” which is accompanying the current way of working. It would also create data-coherency and a holistic view of the whole business process enabling easy analytics. Finally, one piece of software, presumably, should be cheaper than multiple separate ones. To sum up, from all the angles this solution would be more user-friendly and cost-effective. In the real world, though, “one-stop-shop” software for recruitment simply does not exist. Therefore, to eliminate the need of switching between different programs is impossible. However, the philosophy of the chosen analytical lens LSS preaches the elimination/reduction of waste/non-value adding aspects.

Therefore, one of the logical suggestions would be to adopt the “Less is More” mindset. By this we simply mean that it is important to think about the minimum possible number of pieces of software which would fulfill the job-needs - and remove the rest.

**Head-hunting** takes a special place in our discussion as it evokes critical reflections both in time and money ROI. As seen from the collected data, after substantial investments of time (see Fig. 15) and money (see Fig. 18) spent on the head-hunting process, none of the recruited candidates was hired through headhunting. This can absolutely be possible that at any other given time aside from the period of current research, the picture looks differently and the emphasis that is put to headhunting within the recruitment process at company Z may be justified. However, we cannot check it, and according to the data collected during the study it can be said that head-hunting, despite being given extremely high priority, is a pure waste of money and time according to the LSS framework. In this aspect, first, adoption of “Time is Money” philosophy stimulates keeping track of where the time and money is going, and how reasonable the ROI is. In addition, redistribution of resources towards strengthening the employer brand may be a rational alternative in the long run for attracting high quality candidates.

Finally, the importance of cumulating **Insight** for a successful business process maturation needs to be considered. Insight comes from thorough understanding of a business process ingredients and their interdependencies. Fragmentation of information creates confusion and blind spots taking a toll on the ability to see a holistic picture. Filling these knowledge-gaps with actual data helps to eliminate the need in vague estimates and guesses. Actual data collected about a process takes away subjective judgements and provides the ground for rationalism and clarity in decision-making. Data allows sticking to KPIs and regular retrospectives which are the core of a business process maturation. As such, adoption of data-driven approach and making sure that the data collected is integral - are vital for further improvement.

### ✔ **Summary of the section**

The Discussion section summarized and interpreted the most prominent findings and reflections related to the research project. We tried to explain our understandings and insights drawn from the results of the study. What it means and why is it important to have a quality recruitment process, as well as how it can be achieved is discussed in this section. Our reflections



on applying Lean Six Sigma for this project were communicated. We also addressed the tension which exists around the notion of “quality” in various contexts, as well as the role of digital technologies in the modern way of work and business process analysis itself. Finally, practical recommendations based on the findings of the study were provided.

*Key takeaways:*

(1) Lean Six Sigma demonstrated promising results in such business processes as recruitment, where steps are interdependent and cannot be fully automated because they require professional human judgement along the way.

(2) the app developed for collecting data needed for the current business process analysis has the potential beyond the discussed project as it may serve for further monitoring and evaluating purposes within the same context, as well as may be adapted for other environments.

(3) for quality assurance in a business process, insights into data-driven operational and financial ROI are critical.

## 7. Limitations and Suggestions for future research

During the project design, flow, and result analysis we identified three primary limitations of our study. *The first limitation* of the project is that it was a case-study, conducted with one company Z. Being a small sample size, the results of the study may not be generalized and spread to broader context. However, findings during our case study serve as a guiding light signaling a promising direction for further research investigating application of Lean Six Sigma for improvement of recruitment processes, as well as other non-automated business processes requiring professional judgement in decision-making. *Second limitation* of the study is that the data about time-reports and some KPI-related parameters collected by log submissions was based on self-reporting. This aspect may affect reliability and validity of measures since more precise measurement and in-depth analysis would be sounder. However even the data collected for the scope of the project, despite it's not extremely scrupulous accuracy, revealed valuable insights regarding possible improvement opportunities in the analyzed business process demonstrating its practical value. As such, future research opportunities could be within investigating the effect of more precise measurements on practical insights in analyzing business processes requiring human judgement in decision making, such as recruitment. *Final limitation* that affected the study was the time-limit. First, because of limitations in time, it was impossible to cover the entire DMAIC roadmap of the Lean Six Sigma methodology. As such, Improvement and Control phases were kept in the form of suggestions for future improvement opportunities within company Z. In addition, Lean Six Sigma projects are meant to be iterative. The first iteration identifies largest improvement opportunities, while further iterations enable more in-depth analysis and process improvement. Future research conducted over an extended timeframe would enable us to use not only more variations of data-collection methods, but also iteration of the DMAIC process for result validation. Also, because of the limited time we had in hand, we restricted our study to top-five KPIs which were selected as critical to quality in our specific case. KPIs may vary contextually depending not only on a type of a business process, but even within the recruitment processes in different organizations critical to quality KPIs can differ. As such, research on the broader scope of cases would help to identify which KPIs can be relevant in different contexts.

## 8. Conclusions

The entire journey throughout the study aimed to a) reinforce the importance of human resources for building competitive advantage of organizations, and b) to explore ways to achieve a ‘quality recruitment process’, as we call it. As a result, we contribute to the limited resource pool on the usefulness of Lean Six Sigma to improve *knowledge-based business processes requiring professional judgement in decision making*. Alongside, we also contribute theoretically and practically to human resource management in general, and recruitment process improvement in particular. Reflecting on the experience and findings, the following conclusions were drawn.

First, being extremely tightly linked to business goals, underestimating the importance of both Human Resources (HR) and the Strategic HR Management (SHRM) may have dramatic long-term consequences for organizations. As a result, being part of SHRM-related processes, recruitment plays a critical strategic role for a company and requires insightful management. Analyzing the resources invested by company Z, it is clear - they do not fall short in realizing the importance of the recruitment process.

Second, the results of our findings lead us to the conclusion that the deserving appreciation of the HR, SHRM and recruitment in particular, is not enough for designing and maintaining “a quality recruitment process” - cost-efficient and with optimal ROIs. An in-depth analysis of the business process at company Z revealed significant improvement opportunities in contexts of coordination, cost-efficiency, and insight, even though the recruitment process as a whole is treated very respectfully.

Finally, to develop and maintain a smart way of working, it is important to reduce the gut-feeling and develop a data-driven approach. Data integrity and defragmentation of information are vital for insightful business process management. Coherent data enables us to see what is impossible to see through the gut-feeling. In addition, for assuring the superb quality of a business process, regular retrospectives and sticking to critical to quality Key Performance Indicators (KPIs) is crucial.

In attempts to identify ways enabling insightful business process management, Lean Six Sigma (LSS) was selected. LSS is a modular and flexible methodology smoothly convertible into digital format enabling incorporation of technologies and applicable for different contexts.

Through our study, LSS demonstrated promising potential for such business processes as recruitment.

In conclusion, we want to emphasize that in the maturity journey of a business process, it is important to be systematic, consistent, and iterative.

## 9. References

- Abhayawansa, S., & Abeyssekera, I. (2008). An explanation of human capital disclosure from the resource-based perspective. *Journal of Human Resource Costing & Accounting*, *12*(1), 51–64. <https://doi.org/10.1108/14013380810872752>
- Aguilar-Savén, R. S. (2004). Business process modelling: Review and framework. *International Journal of Production Economics*, *90*(2), 129–149. [https://doi.org/10.1016/S0925-5273\(03\)00102-6](https://doi.org/10.1016/S0925-5273(03)00102-6)
- Andellini, M., Fernandez Riesgo, S., Morolli, F., Ritrovato, M., Cosoli, P., Petruzzellis, S., & Rosso, N. (2017). Experimental application of Business Process Management technology to manage clinical pathways: A pediatric kidney transplantation follow up case. *BMC Medical Informatics and Decision Making*, *17*(1), 151. <https://doi.org/10.1186/s12911-017-0546-x>
- Andersson, R., Eriksson, H., & Torstensson, H. (2006). Similarities and differences between TQM, six sigma and lean. *The TQM Magazine*, *18*(3), 282–296. <https://doi.org/10.1108/09544780610660004>
- Antony, J., Vinodh, S., & Gijo, E. V. (2016). *Lean six sigma for small and medium sized enterprises: A practical guide*. <http://www.crcnetbase.com/isbn/9781482260090>
- Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management*, *17*(1), 99–120. <https://doi.org/10.1177/014920639101700108>
- Barney, J. B., Ketchen, D. J., & Wright, M. (2011). The Future of Resource-Based Theory: Revitalization or Decline? *Journal of Management*, *37*(5), 1299–1315. <https://doi.org/10.1177/0149206310391805>
- Bendell, T. (2005). Structuring business process improvement methodologies. *Total Quality Management & Business Excellence*, *16*(8–9), 969–978. <https://doi.org/10.1080/14783360500163110>
- Bergman, B. & Klefsjö, B. (2001). *Kvalitet från behov till användning* (3rd ed.). Lund: Studentlitteratur. ISBN: 91-44-01917-3
- Breyfogle, F. W. (2003). *Implementing six sigma: Smarter solutions using statistical methods* (2nd ed). Wiley.

- Chabukswar, A. R., Jagdale, S. C., Kuchekar, B. S., Kothawade, H. S., Kuckekar, A. B., Joshi, V. D., Deshmukh, G. R., & Lokhande, P. D. (2011). Six Sigma: Process of Understanding the Control and Capability of Ranitidine Hydrochloride Tablet. *Journal of Young Pharmacists*, 3(1), 15–25. <https://doi.org/10.4103/0975-1483.76415>
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (Fifth edition). SAGE.
- Crosby, P. B. (1979). *Quality is free: The art of making quality certain*. McGraw-Hill.
- Das, T. K., & Teng, B.-S. (2000). A Resource-Based Theory of Strategic Alliances. *Journal of Management*, 26(1), 31–61. <https://doi.org/10.1177/014920630002600105>
- Delery, J. E. (1998). Issues of fit in strategic human resource management: Implications for research. *Human Resource Management Review*, 8(3), 289–309. [https://doi.org/10.1016/S1053-4822\(98\)90006-7](https://doi.org/10.1016/S1053-4822(98)90006-7)
- Deming, W. E. (1986). *Out of the crisis*. Massachusetts Institute of Technology, Center for Advanced Engineering Study.
- Foster, S. T. (2004). *Managing quality: An integrative approach* (2. ed., internat. ed). Pearson/Prentice Hall.
- Franklin, Benjamin. (1785). *Advice to a young tradesman [electronic resource] / (Written by Benjamin Franklin, anno 1748.)*. Printed by Daniel Humphreys, at the new printing-office, in Spruce-Street, near the drawbridge Philadelphia. <http://opac.newsbank.com/select/evans/44684>
- Galbreath, J. (2005). Which resources matter the most to firm success? An exploratory study of resource-based theory. *Technovation*, 25(9), 979–987. <https://doi.org/10.1016/j.technovation.2004.02.008>
- Gauci, J. (2010). *What is Lean?* Retrieved on April, 4, 2021 from <https://www.processexcellencenetwork.com/lean-six-sigma-business-performance/articles/what-is-lean>
- George, M. L. (2003). *Lean Six Sigma for service: How to use Lean Speed and Six Sigma Quality to improve services and transactions*. McGraw-Hill.
- Gershon, M. (2010). Choosing which process improvement methodology to implement. *The Journal of Applied Business and Economics*, 10(5), 61.

- Harry, M. J., & Schroeder, R. (2000). *Six sigma: The breakthrough management strategy revolutionizing the world's top corporations* (1st ed). Currency.
- Hayler, R., & Nichols, M. (2007). *Six sigma for financial services: How leading companies are driving results using lean, six sigma, and process management*. McGraw-Hill.
- Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed Methods Research: A Research Paradigm Whose Time Has Come. *Educational Researcher*, 33(7), 14–26. <https://doi.org/10.3102/0013189X033007014>
- Kincaid, W. H. (1980). Issues in the Definition of Quality. *Proceedings of the Annual Symposium on Computer Application in Medical Care*, 3, 1739–1741. PMC.
- Klefsjö, B., Elisasson, H., Kennerfalk, L., Lundbäck, A., Sandström, M. (1999). *De sju ledningsverktygen: För effektivare planering av förbättringsarbetet*. Lund: Studentlitteratur. ISBN: 91-44-00607-1
- Landay, K., & DeArmond, S. (2018). Recruitment Process Outsourcing and Recruiter and Hiring Firm Characteristics: A Two Study Investigation. *Journal of Personnel Psychology*, 17(4), 183–192. <https://doi.org/10.1027/1866-5888/a000206>
- Magnusson, K., Bergman, B., & Kroslid, D. (2009). *Six Sigma the pragmatic approach*. Studentlitteratur.
- Mandahawi, N., Araidah, O. A., Boran, A., & Khasawneh, M. (2011). Application of Lean Six Sigma tools to minimise length of stay for ophthalmology day case surgery. *International Journal of Six Sigma and Competitive Advantage*, 6(3), 156. <https://doi.org/10.1504/IJSSCA.2011.039716>
- Montgomery, D. C., & Woodall, W. H. (2008). An Overview of Six Sigma. *International Statistical Review*, 76(3), 329–346. <https://doi.org/10.1111/j.1751-5823.2008.00061.x>
- Reid, R. A. (2006). Productivity and quality improvement: An implementation framework. *International Journal of Productivity and Quality Management*, 1(1/2), 26. <https://doi.org/10.1504/IJPQM.2006.008371>
- Sangeetha, K. (2010). *Effective Recruitment: A Framework*.
- Schuler, R. S., & MacMillan, I. C. (1984). Gaining competitive advantage through human resource management practices. *Human Resource Management*, 23(3), 241–255. <https://doi.org/10.1002/hrm.3930230304>

- Snee, R. D. (2010). Lean Six Sigma – getting better all the time. *International Journal of Lean Six Sigma*, 1(1), 9–29. <https://doi.org/10.1108/20401461011033130>
- Srivastava, K., & Das, R. (2015). Human capital management: Economics of psychological perspective. *Industrial Psychiatry Journal*, 24(2), 115. <https://doi.org/10.4103/0972-6748.181717>
- Taylor, M., & Collins, C. J. (2000). *Organizational Recruitment: Enhancing the Intersection of Research and Practice*.
- Taylor, M. S., & Bergmann, T. J. (1987). Organizational recruitment activities and applicants' reactions at different stages of the recruitment process. *Personnel Psychology*, 40(2), 261–285. <https://doi.org/10.1111/j.1744-6570.1987.tb00604.x>
- Truss, C., & Gratton, L. (1994). Strategic human resource management: A conceptual approach. *The International Journal of Human Resource Management*, 5(3), 663–686. <https://doi.org/10.1080/09585199400000053>
- Villeda, M., & McCamey, R. (2019). Use of Social Networking Sites for Recruiting and Selecting in the Hiring Process. *International Business Research*, 12(3), 66. <https://doi.org/10.5539/ibr.v12n3p66>
- Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, 5(2), 171–180. <https://doi.org/10.1002/smj.4250050207>
- Womack, J. P., & Jones, D. T. (1996). *Lean thinking: Banish waste and create wealth in your corporation*. Simon & Schuster.
- Wright, P. M., & McMahan, G. C. (1992). Theoretical Perspectives for Strategic Human Resource Management. *Journal of Management*, 18(2), 295–320. <https://doi.org/10.1177/014920639201800205>



## **10. Appendix**

### **10.1. Appendix 1**

**INSTRUCTIONS:**

DEAR PARTICIPANT!  
 BIG THANK YOU FOR PARTICIPATING IN THE RESEARCH NEEDED FOR THE ONGOING PROJECT! OUR GOAL IS TO COLLECT DATA ABOUT DIFFERENT ASPECTS OF THE RECRUITMENT PROCESS AND HELP THE HR TEAM TO ANALYZE THEIR WORKFLOW AND, HOPEFULLY, FIND IMPROVEMENT OPPORTUNITIES.

PLEASE, PUT YOUR SUBJECTIVE GRADE FOR EACH OF THE STEPS IN THE HIRING PROCESS WHERE 10 IS THE MAXIMUM. FEEL FREE TO MAKE YOUR INTERPRETATIONS.

**MARK YOUR BACKGROUND**

- HR TEAM
- HIRING MANAGER/FOUNDER
- NEWLY HIRED

Importance in hiring process __/10 Effort required __/10 How well organized __/10	Importance in hiring process __/10 Effort required __/10 How well organized __/10	Importance in hiring process __/10 Effort required __/10 How well organized __/10	Importance in hiring process __/10 Effort required __/10 How well organized __/10	Importance in hiring process __/10 Effort required __/10 How well organized __/10
Requirement profile	Video presentation/ Screening interview	Personality test and feedback session with recruiter	Reference check	Contract
<b>STEP 1</b>	<b>STEP 3</b>	<b>STEP 5</b>	<b>STEP 7</b>	<b>STEP 9</b>
	<b>STEP 2</b>	<b>STEP 4</b>	<b>STEP 6</b>	<b>STEP 8</b>
	Publish job ad	Face-to-face interview and tour of the office	Interview with hiring manager's manager (if needed)	Founders interview/ Case exercise
	Importance in hiring process __/10 Effort required __/10 How well organized __/10	Importance in hiring process __/10 Effort required __/10 How well organized __/10	Importance in hiring process __/10 Effort required __/10 How well organized __/10	Importance in hiring process __/10 Effort required __/10 How well organized __/10

◆ Appendix 1: Survey Value & Quality Analysis conducted in Google-form, adapted for paper format

## 10.2. Appendix 2

DIVYASHREE KRISHNAMURTHY & ANASTASIIA TSARENKO  
 MASTER THESIS PROJECT  
 DMAIC: SURVEY 2 - ASSUMPTIONS AND ESTIMATES

**INSTRUCTIONS:**

DEAR PARTICIPANT!  
 BIG THANK YOU FOR PARTICIPATING IN THE RESEARCH NEEDED FOR THE ONGOING PROJECT! OUR GOAL IS TO COLLECT DATA ABOUT DIFFERENT ASPECTS OF THE RECRUITMENT PROCESS AND HELP THE HR TEAM TO ANALYZE THEIR WORKFLOW AND, HOPEFULLY, FIND IMPROVEMENT OPPORTUNITIES.

PLEASE, PUT YOUR ESTIMATE OF THE NUMBER OF WORKING HOURS\*\*\* SPEND PER MONTH ON EACH OF THE STEPS OF THE HIRING PROCESS.

\*\*\*IN HOURS OR % OF WORKING TIME ASSUMING THAT WORKING WEEK IS 40 HOURS.

**MARK YOUR BACKGROUND**

HR TEAM  
 HIRING MANAGER/FOUNDER

I estimate, every month on this stage is spent \_\_\_\_\_ hours

I estimate, every month on this stage is spent \_\_\_\_\_ hours

I estimate, every month on this stage is spent \_\_\_\_\_ hours

I estimate, every month on this stage is spent \_\_\_\_\_ hours

I estimate, every month on this stage is spent \_\_\_\_\_ hours

Requirement profile

Video presentation/ Screening interview

Personality test and feedback session with recruiter

Reference check

Contract

**STEP 1**

**STEP 3**

**STEP 5**

**STEP 7**

**STEP 9**

**STEP 2**

**STEP 4**

**STEP 6**

**STEP 8**

Publish job ad

Face- to- face interview and tour of the office

Interview with hiring manager's manager (if needed)

Founders interview/ Case exercise

I estimate, every month on this stage is spent \_\_\_\_\_ hours

I estimate, every month on this stage is spent \_\_\_\_\_ hours

I estimate, every month on this stage is spent \_\_\_\_\_ hours

I estimate, every month on this stage is spent \_\_\_\_\_ hours

◆ Appendix 2: Survey Assumptions & Estimates conducted in Google-form, adapted for paper format

### 10.3. Appendix 3

DIVYASHREE KRISHNAMURTHY & ANASTASIIA TSARENKO  
 MASTER THESIS PROJECT  
 DMAIC: SURVEY 3 - CANDIDATE EXPERIENCE

**INSTRUCTIONS:**

DEAR PARTICIPANT!  
 BIG THANK YOU FOR PARTICIPATING IN THE RESEARCH NEEDED FOR THE ONGOING PROJECT! OUR GOAL IS TO COLLECT DATA ABOUT DIFFERENT ASPECTS OF THE RECRUITMENT PROCESS AND HELP THE HR TEAM TO ANALYZE THEIR WORKFLOW AND, HOPEFULLY, FIND IMPROVEMENT OPPORTUNITIES.

PLEASE, PUT YOUR SUBJECTIVE GRADE FOR EACH CRITERIA ALONG THE STEPS IN THE HIRING PROCESS WHERE 10 IS THE MAXIMUM.

**CRITERIA**

1. EXPECTATIONS FOR THIS STAGE WERE CLEAR FOR ME
2. THE PROCESS FLOW AT THIS STAGE WAS CLEAR FOR ME
3. I FELT THE COMMUNICATION WAS POSITIVE AND RESPECTFUL
4. MY TIME AS A CANDIDATE WAS VALUED
5. PROPER FEEDBACK BOTH TAKEN AND GIVEN
6. I FELT WARMLY WELCOMED AND NEEDED IN THE COMPANY
7. IT WAS EASY TO ACCESS THE INFORMATION AND FOLLOW PROCEDURES ON GADGETS OTHER THAN A COMPUTER (IF TESTED)

1._/10	1._/10	1._/10	1._/10	1._/10
2._/10	2._/10	2._/10	2._/10	2._/10
3._/10	3._/10	3._/10	3._/10	3._/10
4._/10	4._/10	4._/10	4._/10	4._/10
5._/10	5._/10	5._/10	5._/10	5._/10
6._/10	6._/10	6._/10	6._/10	6._/10
7._/10	7._/10	7._/10	7._/10	7._/10

Requirement profile  
**STEP 1**

Video presentation/  
 Screening interview  
**STEP 3**

Personality test and  
 feedback session with  
 recruiter  
**STEP 5**

Reference check  
**STEP 7**

Contract  
**STEP 9**

**STEP 2**  
 Publish job ad

**STEP 4**  
 Face- to- face interview  
 and tour of the office

**STEP 6**  
 Interview with hiring  
 manager's manager  
 (if needed)

**STEP 8**  
 Founders interview/  
 Case exercise

1._/10	1._/10	1._/10	1._/10
2._/10	2._/10	2._/10	2._/10
3._/10	3._/10	3._/10	3._/10
4._/10	4._/10	4._/10	4._/10
5._/10	5._/10	5._/10	5._/10
6._/10	6._/10	6._/10	6._/10
7._/10	7._/10	7._/10	7._/10

◆ Appendix 3: Survey Candidate experience analysis conducted in Google-form, adapted for paper format