



The process of on-boarding minors in retail banking

A process evaluation using the Lean Six Sigma framework

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<p>Abstract:</p> <p>The process of onboarding minors in a commercial bank has become more complex due to EU regulation, such as KYC and AML requirements. Regulation in combination with the digitalization and automation of processes within the financial industry means that the onboarding process becomes slower if the process itself is not updated. This study aims to analyze and understand an onboarding process within a Finnish commercial bank. This is a case study, limited to the onboarding of underage customers within a Finnish commercial bank. The study utilizes the Lean Six Sigma framework and the DMAIC approach to analyze the process and improve it by using Robotic Process Automation to make the process more efficient and less dependent on manual labour. The studies results indicates that the current process is heavily dependent on manual labour and has unnecessary long idle times within the process due to fragmented customer interactions. The process flow in its current state doesn't support the application of RPA. The improvement suggestions include a process reconfiguration to better support automation and concentrating the customer interactions to minimize idle-time.</p>	
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List of abbreviations

AML–Anti money laundering

CX–Customer experience

CRM – Customer relationship management

CRM-system- A common nominator of a system which is used to handle Customer relations

DMAIC–A Six sigma framework with the structure; Define, Measure, Analyze, Improve, Control

EU–The European Union

KYC–Know Your Customer

RPA–Robotic process automation

TPS –Toyota Production System

1 INTRODUCTION

Anti-money laundering and know-your-customer compliance have become leading concerns at commercial banks in EU during the last years. The increase of AML regulation in the US, UK, and EU have led to more complex compliance measures and processes within the commercial banks. The growing regulatory focus on risks such as tax evasion and anti-corruption is not likely to change, meaning that compliance measures and processes for risk assessment will play a continued role within financial institutions.

In 1998 G. Elliehausen published a paper on the cost of regulation in the Federal Reserve Bulletin where he researched the aggregate cost of regulation within banking. The main message from this study was that compliance activities are labour-intensive and that labour costs are the major component of compliance costs.

The more regulation there is the more compliance methods there needs to be in place to be able to guarantee compliance with said regulations. New processes and regulation requirements often comes with a cost. This includes not only direct costs for compliance operations and technology, but also indirect costs from the impact of compliance on productivity, customer acquisition and business growth. (Elliehausen, 1998)

When it comes to customer acquisition and the onboarding of new customers an accurate risk assessment of the new customer is essential. KYC and AML regulations makes this process more complex both for the customer and the financial institution. In an interview with Marius Galdikas, CEO at ConnectPay in March 2021 on KYC and larger payment transfers he concludes that current KYC requirements is a significant investment, on top of providing a good customer experience and quality product (PaymentsJournal, 2021).

Customer experience in many ways often translates to low effort from the customers side along with low waiting times. When it comes to onboarding new customers AML and KYC regulations are a large part of the onboarding process cycle and the automation of KYC and AML processes in extension speeds up the onboarding process. There is, however, a process continuing after the KYC requirements has been filled. Making the services available to the customer is equally important and is also a big part of the customer experience. Casey Win-

ters, a growth advisor, stated, in a speech at slush in 2018 that onboarding is the most important part of your growth strategy (Slush, 2018). Fast and efficient processes for KYC compliance in tandem with a streamlined onboarding process has the potential to offer good customer experience for new customers and lower costs for financial institutions.

The growing demand of digital services and the demand of procuring these services without much effort from the customers side puts pressure on the commercial banks to make their services available while still maintaining compliance requirements and adequate risk assessments.

For the commercial banks to be able to provide services to new customers the underlying KYC and AML processes and the onboarding in general needs to be efficient and both in time and cost. By having an efficient onboarding process financial institutions can minimize the cost that derives from regulation compliance requirements.

1.1 Aim and research question

The research aim is to closely analyze the current onboarding process suggestions to improve efficiency both for the customer and for the bank. To establish and understand the current process and to be able to suggest improvements the study needs to:

1. Establish a clear connection between regulation and the current process.
2. Present the goal of the onboarding process and present each step of the process.
3. Measure the process, both in the aspect of how long the process cycle takes and labour intensity.

The study aims to provide the following:

1. An understanding of which parts of the process that are inefficient.
2. How the process can be made more efficient by automating parts of the process.

3. To provide a framework on how an automated process can be measured and controlled in the future.

The research question for the study is:

Is the current onboarding process efficient, and what can be done to possibly improve the efficiency?

1.2 Limitations

The scope of the study is limited to the process of on-boarding minors in a commercial bank and how to make the process more efficient by automating parts of the process to eliminate manual labour. The onboarding process is analyzed mainly from the aspect of the bank and will not directly evaluate the user experience from a customers' perspective. The main goal is, however, an efficient process overall and efficiency within the bank will also in this regard also mean a more efficient user experience.

1.3 Research method and research material

The Six Sigma framework with the Define–Measure–Analyze–Improve–Control (DMAIC) approach is used as the method to measure the process efficiency. Six Sigma is defined by (Linderman et al., 2003) as “(...) an organized and systematic method for strategic process improvement and new product and service development that relies on statistical methods and the scientific method to make dramatic reductions in customer defined defect rates.”

Six Sigma as a method supports a structured approach to managing process improvements, which is represented by Define–Measure–Analyze–Improve–Control (DMAIC) (Fursule et al., 2012). DMAIC, as an approach, is applied to cater for generic problem-solving and improvement (De Mast & Lokkerbol, 2012). When it comes to process management and process improvement a six sigma approach aims to improve profitability, minimize waste, and improve overall efficiency of business operations (Dhiraj & Deepak, 2014).

The research aim is to study and improve the process of onboarding minors within a retail bank and the six sigma framework, along with the DMAIC approach, supports this aim and provides a structured framework where the process can be measured.

The study form and the data is in a quantitative form where numerical data is used to measure the effectiveness of the process on onboarding minors.

The data will consist of a detailed process chart, observations, data point analysis and lead time of the whole onboarding process. The data is collected by creating a detailed process chart where each step of the process is visualized. Each step of the process will represent a data point. Each data point and the transitions between each data point will then be measured in time to establish a median time rate so that the process time cycle can be evaluated. These measurements are used to conclude which part, or parts, of the process is time-consuming and can be improved on. The observational data will consist of observations on which part, or parts, of the process that demands manual input. This data is used in the performance analysis to suggest improvements to minimize manual input and possible human error within the process.

1.4 Structure of the thesis

The study is divided into six different chapters. The introduction focuses on the aim and research question following the limitations of these study and the research material. The second chapter reviews the theoretical framework which includes a section about previous research. The third chapter describes the method used to measure the process efficiency. Chapter four analysis the results and describes the current process and the data collected to measure the process and what kind of trends can be identified in data. The fifth chapter discusses the results and the improvement suggestions. The last part consists of the conclusion, limitations of the data samples and suggestions for future research.

2 THEORETICAL FRAMEWORKS

This part will provide the situational analysis and the theoretical framework on the current process, automation, KYC and other legislation.

2.1 Previous research

Previous research has shown that onboarding commercial banking clients can be a long and expensive process. The process can, and often do, include several steps from soliciting and confirming new clients, collecting account owner data, validating client data, setting up credit lines and limits, completing the KYC process and finalizing the onboarding. (Sridhar, Ramachandran and Moyer, 2018)

New challenger banks within the financial industry, including Revolut, Simple, Tide, Monzo, Apple Pay, Alibaba and Amazon, commercial and business banks that rely on more traditional ways of onboarding new clients are in danger to fall behind and become obsolete. In 2018 the global commercial and business banking market \$3.3 trillion due to abandoned onboarding applications. The shift to digital banking is changing the onboarding process, but many banks still rely on manual KYC processes that includes, mail, telephone or in person meetings. (Walker, 2019)

In 2018 PWC did a survey among commercial banks in Germany that aimed to research the current challenges of onboarding customers. The survey found that biggest challenge for the study participants was to ensure a positive customer experience and high acceptance across all interaction channels (70%). Today's customers are more willing to change banks if their existing banks do not fulfil their demands on services such as mobile banking and flexible financial services. Dissatisfied customers are more likely to drop their application for services and move elsewhere if the customer experience is unsatisfactory This indicates that customer experience has a major impact on the conversion rate of new customers. (Hamele and Dathan, 2018)

The customer journey and the customer experience (CX) usually starts with the onboarding of a customer. Digital McKinsey did a survey in 2016 among senior executives in France, Ger-

many, Italy, the UK, and the US where 90 percent of the respondents marked customer experience as one of their top three priorities. (Dias *et al.*, 2016) For financial institutions rising customer expectations are pressing organizations to improve even as alternatives to traditional financial services are emerging. The same report also conducted a customer survey to further analyze the importance of customer experience in an end-to-end customers journey. The customer survey suggests that transparency of price and fees, ease of communication with the bank, and the ability to track the status of the onboarding process accounts for 42 percent of overall satisfaction. The part of the survey made in France showed that customer satisfaction drops by up to 30 percentage points if the time to open an account takes more than 45 minutes.

McKinsey analyzed three different types of customer journeys: those that are completely online, those that start online and finish in a branch, those that start in a branch and finish online, and those that take place fully in a branch. The report found that digital-first journeys led to higher customer satisfaction scores and generated 10 to 20 percentage points more satisfaction compared to traditional journeys. (Dias *et al.*, 2016)

2.2 Know Your Customer

The 5th Anti-money Laundering Directive was adopted in April 2018 to further strengthen the fight against terrorist financing, and in response to the release of Panama Papers of April 2016. (Koster, 2020)

The extensive use of new technologies and the online services makes it necessary to define standards that help fight fraud and money laundering. KYC procedures aim to respond to a legal and global imperative when it comes to client onboarding.(electronicid.eu, 2021)

The “Know your customer” (KYC) is a EU-legislation that aims to control and mitigate money laundering and the financing of terrorism. KYC processes within financial institutions and banks relies heavily on identity management, and provide the structure and framework of organizational and financial institutions’ anti-money laundering efforts. (de Almeida, Fazendeiro and Inácio, 2018)

The cost of complying with KYC and anti-money laundering regulations is increasing each year and financial institutions that do not comply with the regulations will be penalized. With the addition of cost to the banks the KYC process is often a slow and inconvenient for the clients (Soltani, 2018)

The objective of KYC guidelines is to prevent financial institutions from being used for money laundering. Identity management processes and the KYC framework also enable businesses to better understand their customers and their financials structure and origin. Customer insight procured by KYC processes also provides data and insight for adequate risk management. KYC principles apply to banks as well as different online businesses. The KYC framework and legislation in practice often includes customer acceptance policy, customer identification procedures, the monitoring of transactions and risk management.

Due to EU KYC legislation and in accordance to Finnish law, banks active in Finland are required to comply with the customer due diligence standards. This means that banks must identify and know their customers. The information needed includes personal details of the customer but also sufficient information on the customer's activities, financial position, banking practices, and purpose for which the services are used. In practice, banks must verify their customers' identity from an official identity document. Banks also needs information on where incoming money comes from and what the money is going to be used for. (Federation of Finnish Financial Services, no date)

The legal basis for the KYC process and its due diligence that makes the process necessary is the 3rd EU Money Laundering Directive. The fourth and the fifth Directive, in extension, functions as an extension for this framework. (Federation of Finnish Financial Services, 2021)

The KYC process involves checking personal and business details in order to exclude potential high-risk customers who may appear on sanctions lists, watch lists and PEP lists and to identify ownership relationships, possible Involvement in Anti Money Laundering.

An effective method to prevent money laundering is to prevent accounts from being opened in false identities. The KYC legislation and framework states that anyone who wishes to open an account will be asked for proof of their identity and address. These documents have to be procured by the service provider irrespective of the type of account to be opened and the purpose

for which the account is opened for. This also includes opening services for minors and persons under guardianship. In this case the guardian will be the one providing the required information.

The KYC legislation and AML requirements effectively decides the requirements of the onboarding of new customers within the finance industry. The onboarding process design needs to support the legislation and eliminate the possibility to acquire banking services without providing the needed information.

2.3 The onboarding of new customers in retail banking

Before the introduction of internet banking and digital services overall, the only way to enrol as a customer of a consumer-bank was visiting the branch-office. The process usually involved a phone call to book an appointment with a representative at your closest branch-office and visit there with all the needed paper-work. The whole process of on-boarding a customer in this manner, depending on how both the banks and the customers schedule, could range from one to three weeks.

With the induction of digital services and more available access to the authorities databases where you can validate personal information such as social security numbers the time needed for the validation process was shortened. The back-office workload became lighter but the new customers still needed to visit the branch office and schedule an appointment.

When the EU introduced stricter legislation when it comes to anti money laundering a more extensive background check was needed when onboarding customers. This was implemented by the financial institutions in different ways to comply with the EU standard of the new Know your customer legislation. This added a layer of security and protection for the financial system in general but also a heavy workload for the consumer banks. Regulation in general always adds a certain degree of cost and added workload for financial institutions (European Parliament, 2005)

The overall process of the onboarding and customer experience during the late 2010s was still dependent on a visit to the branch office at some point in the process. This process changed

with the introduction of identifying new customers remotely. The process involved any Finnish banks internet-banking credentials which allows a new customer to send a secure message through the internet bank which then could be used as a token of identification.

This process, in addition to an online form that complies with the KYC, was then used to actually onboard customers and open services. A full internet bank agreement was, however not possible to open this way. This means that the customer still needs to visit a branch-office at some point to obtain a full scale internet bank agreement which you can use to identify yourself in different online services.

Most banks in Finland follow the same concepts where a new customer can open services online by using another banks web-banking codes as a token for identification. This method is used by Nordea (Nordea, 2021), Aktia (Nordea, 2021) Osuuspankki (Aktia Bank Plc, 2021) and Nordnet (Osuuspankki, 2021)The process of using another banks web-banking codes as a token of identifications is heavily based on trust of other institutions that has granted the use of a web-banking agreement that can be used as an identification method elsewhere. For an institution to be able to provide new customers with this feature a strong authentication method must be used. In this case a passport or a similar identification paper must be provided. To do this a visit to the branch office is still required. (Directive 2005/60/EC of the European Parliament and of the Council of 26 October 2005 on the Prevention of the Use of the Financial System for the Purpose of Money Laundering and Terrorist Financing, 2005). This in extension means that new customers without an existing web-banking agreement must visit a branch office for the first identification.

2.4 KYC within the onboarding process

The importance of the KYC legislation is most prominent when a private individual, a company, or an organization applies for banking services. The idea of KYC is to screen and eliminate possible financial crime before providing financial services. (European Parliament, 2005)

This makes the KYC process one of the first things that need to be completed before any financial services can be made available. The KYC is often integrated into the onboarding pro-

cess. The KYC part of the onboarding process is, in many cases, a form where you need to provide your personal information, proof of identification, information of the nature and size of their financial transactions, their account type, the reason for their account, and the source of their funds (European Parliament, 2005). Information on customers taxation information is also asked. This form can be filed digitally or at a branch office. Osuuspankki (Manning, 2021), Aktia (Osuuspankki, 2021), and Nordea (*Asiakkaan tunteminen*, no date) follows the same process.

The KYC legislation and the integration of the KYC process is done similarity when open banking services for minors. In this case the ones filing the form and the needed information are the guardians.

2.5 Robotic process automation (RPA)

Robotic process automation is the process of replacing manual labour with software and robotics.

Robotic automation is the application of technology and methodology to use computer software instead of manual labour to use existing application software interfaces in the same way a person today completes a process. This process can range from opening services, finding data in a database or file a claims application. Robotic automation doesn't necessarily replace existing software applications; instead, automation software utilizes this software to perform the specific task that the "robot" has been programmed to complete. (Nordea, 2021)

In the past few years, robotic process automation (RPA) and automation initiatives in general has been the focus of many corporations. The Information Services Group published a report in 2018 that shows that 54% of European companies had plans to automate at least 10 processes via RPA by 2020. (Information Services Group, 2018)

RPA, in its essence, allows companies to make processes more efficient by adding scalability to the process and diminish non-value adding activities and focus resources on growth instead of on repetitive manual tasks. As well as scalability and cost efficiency RPA also offers

shorter cycle times. These tend to be motivating factors for companies to ensure the automation of processes by using software. (Information Services Group, 2018)

Within the financial market and within commercial banks process automation has been widely used in a range of different applications. Processes with high-volume labour and repetitive tasks where rule-based decisions with minimal deviations are key, tend to be good candidates for automation. Processes with these features range from KYC processes, validating and setting up customer data, customer screening and risk assessment among others. (Sutherland, 2013)

2.5.1 Benefits and limitations of RPA

Processes that are rule-based, can be defined and is repeatable, tends to work best as candidates for automation. If an automation can be reliably and accurately automated there are several benefits of doing so.

RPA tends to make processes more cost-efficient and increases the overall accuracy. Robots can operate 24/7 with a higher accuracy. This is due to the fact that a robot can be programmed with a set of rules that it follows with no exceptions. (N. Vysya, Venkatesha, Shah, 2018) RPA also provides more consistent and accurate data. Access to error-free, accurate data from various sources would improve the quality of analytics in the process. Speed is also an important factor since an automated process can handle a larger amount of data in a much shorter time span than a human. (Cohen, Rozario and Zhang, 2019) If a robot can be used to automate repetitive tasks and free up resources to decrease manual labour, the human resources used for these tasks can then be utilized in work that's not possible to automate.

RPA should be used for long repetitive tasks to streamline business processes. RPA tends to be inefficient and not very effective for automating processes if it involves a human element or if it is fed with data of substandard quality (Patri, 2020).

2.6 Customer experience

Customer experience (CX) can be defined as the customer's subjective perceptions and feelings when, during, and after an interaction with a service, channel, or a product. (Lemke et al., 2011)

CX is a central part of marketing theory and practice. Providing good and meaningful CX is often viewed as an essential part of achieving advantages among competitors and high customer satisfaction. (Verhoef et al., 2009)

CX is the total result of every interaction a customer has with a business. These interactions include navigating the website, contact with the customer service and receiving requested services or goods. (Verhoef *et al.*, 2009)

Generally speaking, good customer experience comes from when an interaction is perceived as expected or beyond the customers' expectations. On the contrary, bad customer experience can be caused by, long waiting times, failure to understand customer needs, unresolved issues, too much automation, or rude employees.(Hotjar, 2021)

Studies have shown that adding complexity to the service and value chain, also makes it harder to provide good CX. (Hotjar, 2021)

In short; good CX improves perceived customer value and customer satisfaction whereas bad CX provides the opposite.

2.7 Cycle time and Lead time

“Cycle time is the actual time spent working on producing an item or providing a service, measured from the start of the first task to the end of the last task. Cycle time includes both value-added time and non-value-added time.” (Rawson, Ducan and Jones, 2014) The cycle time is an internal measurement and is not visible to the customer.

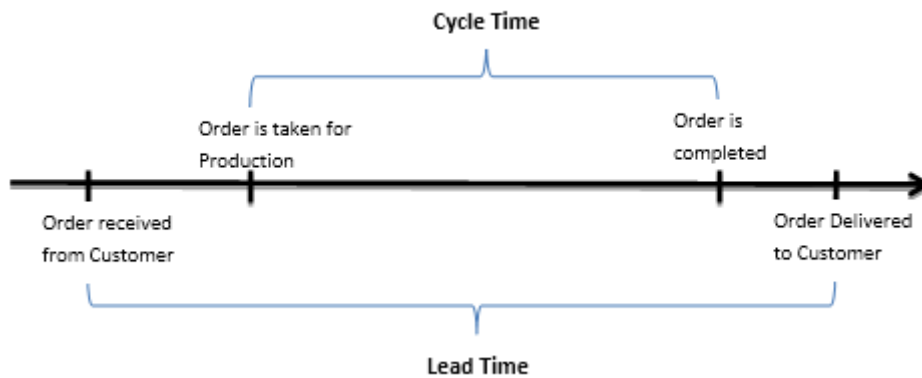


Figure 1: Illustration of Cycle time and Lead Time (www.whatissixsigma.net, n.d.)

The Lead

time on the other hand is the total time from the point where the customer has imitated a request to the point where the product is delivered to the customer. This measurement is an external measurement and is visible to the consumer. Led time signifies the speed of delivery to the customer. (Hajek, 2011)

The cycle time and the lead time is two different measurements from the same process time. The cycle time and lead time is, however, interlinked meaning that lesser the Cycle time, lesser is the Lead time. In this study the Lead time will be the measurement used.

3 METHOD

This study will focus on the onboarding of minors as customers to a commercial bank. A Finnish retail bank is used as a case study, where an internal process of onboarding minors is analyzed and measured using a Six Sigma framework. The study uses quantitative data in the form of measured time to measure the onboarding process' performance and suggest improvements based in the results.

3.1 Data and data collection

The study form and the data is in a quantitative form where numerical data is used to measure the effectiveness of the process on onboarding minors.

The data will consist of a detailed process chart, observations, data point analysis and lead time of the whole onboarding process. The data is collected by creating a detailed process chart where each step of the process is visualized. Each step of the process will represent a data point. Each data point and the transitions between each data point will then be measured in time to establish a median time rate so that the process time cycle can be evaluated. These measurements are used to conclude which part, or parts, of the process is time-consuming and can be improved on. The observational data will consist of observations on which part, or parts, of the process that demands manual input. This data is used in the performance analysis to suggest improvements to minimize manual input and possible human error within the process.

A sample of two data sets is used to calculate a median and an average on how much time each step takes. Each customer onboarding process consists of 22 data points. Dataset one consists of 22×20 (440) data-points. Data set one functions as a qualitative data set that focuses on the time spent on, and between, each step in the process. Data set two consists of data collected in a larger quantity from a CRM system. Data set two consists of 8×40 (320) data-points. Dataset two functions more as a quantitative data set that aims to identify and underline trends within the onboarding process. The time measurements will be processed and calculated in a spreadsheet.

The data provided for the analysis is quantitative, and the analysis is qualitative. In this study, time is the key element of the process effectiveness. By measuring the time for each manual step in the process we can better understand which parts of the process are ineffective.

3.2 Research tools

The Lean Six Sigma framework and DMAIC with a quantitative research approach has been used as a method to form a structured base for analysis.

3.3 Quantitative research

A quantitative research method has its basis in quantifying variables and analyze those in order to get results. It involves the use of numerical data using statistical techniques to answer the stated research question. (www.whatissixsigma.net, 2021) Because measured data is the basis of quantitative research, and the measurements used in this study can be retested using the “the test-retest method” (Bryman, 2012) a quantitative approach adds stability to the research. A quantitative research approach with collected data also makes generalization possible. (Bryman, 2012)

3.4 Lean methodology

The Toyota Production System (TPS) was introduced after the second world war and provided the basis of the Lean philosophy. The method originates from the Toyota motor when capital and resources fell short and the company was forced to eliminate all waste from the production lines. Waste was defined as “anything other than the minimum amount of equipment, materials, parts, space, and time which are absolutely essential to add value to the product” (Daniel, 2016) The core of TPS is operational stability. This translates to an even distributed attention to all factors involved in the production process and the work flow. This includes time, material flow, information flow and qualified workers (Sayer & Williams, 2007).

Taiichi Ohno was employed by Toyota and was instructed to follow this philosophy. Ohno would later establish the main principles to the TPS paradigm. (White and Prybutok, 2001) Production managers in the US and in Europe began to apply these new management practices in their organizations. These management practices were introduced as just-in-time (JIT) manufacturing. (White and Prybutok, 2001)

During the 1990s James P. Womack reviewed the concepts of the TPS model through a study of the automotive industry (the International Motor Vehicle Program – IMVP). This study later evolved to the Lean philosophy. (White and Prybutok, 2001)

3.5 Lean Six Sigma

Six Sigma is an organized and systematic method for strategic process improvement and new product and service development that relies on statistical methods and the scientific method to make dramatic reductions in customer defined defect rates.” (Womack and Jones, 1997)

Six Sigma is a set of techniques that were introduced by Bill Smith at Motorola in 1986. Six Sigma shares the same methodologies and tools as Lean management, but they are two different programs that focus on different improvement variables. Lean Management focuses on reducing waste whereas Six Sigma focuses on eliminating defects and variation. Both Lean and Six Sigma is driven by data, but the accuracy of the data is more prevalent within Six Sigma.

Six Sigma. Six Sigma's inherent focus on more detailed variations and possible defects within problem-solving makes the method a good framework for improving processes. (Linderman et al., 2003)

Although the Six Sigma method was initially introduced within the manufacturing industry, it has later expanded into other fields (Pandey, 2007). This methodology aims to scientifically measure and analyze the current state of a process including effectiveness and efficiency of a process.(Pandey, 2007).

As a problem-solving framework, Six Sigma utilizes five distinct steps to outline a possible solution. The five phases; Define, measure, Analyze, Improve and Control, also known as its acronym DMAIC aims to improve existing process problems with unknown causes (Siha and Saad, 2008)

3.5.1 DMAIC

The DMAIC method, known for reducing variation, and the application of DMAIC in practice can be considered a universal mechanism for problem-solving and process improvement. (Siha and Saad, 2008)The benefits of the implementation of Six Sigma's DMAIC has been widely researched and Six Sigma projects demonstrated substantial cost reduction and intangible gains such as better employee morale, teamwork, and productivity (Antony et al., 2016).

The benefits of the DMAIC approach in process development is that its cycle is reusable and allows businesses to repeat the process, identifying further enhancements and improvements over time. It also enables decision-making to be based on actual data and measurement. The various tools and techniques used in the analysis phase is an effective way to shine light on possible defects or bottlenecks within processes that mightn't been detected without a structured approach. (Antony *et al.*, 2016)

The first phase in the Lean Six Sigma improvement process is the definition of the problem and the process. This phase includes a detailed process chart with the aim to understand the process and possible challenges in the process performance.

The measuring phase aims to clarify how the process performs at its current stage. This phase includes creating a plan to collect needed data, ensure that the data is reliable, gather the baseline data and analyze the cycle The lead time measures a specific stage or part of the process. In this study the outline will be a full development workflow and the time spent on the onboarding.

The analyzing phase revolve around understanding and going through the collected data to identify trends and possible bottlenecks. (Patil, 2014)

From the analysis stage of the data the process can then be improved upon. This involves the eliminating the root cause of any problems in the process and minimizing any deficiencies in the process. In this study the aim will be to shorten the cycle time and improving the overall customer experience.

The control phase of the DMAIC approach will be out this studies scope, but the phase includes controlling and measuring the improvements made to the process.

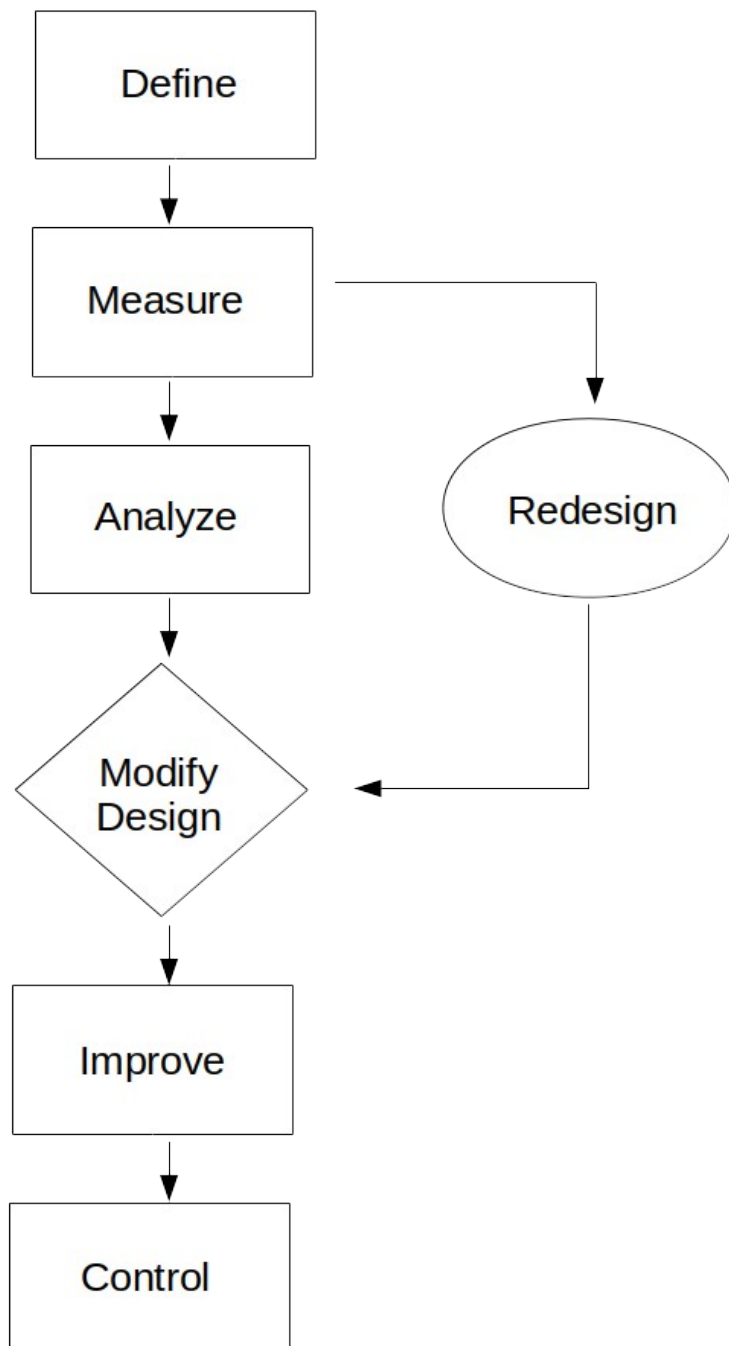


Figure 2: Process chart of DMAIC

3.6 How Lean Six Sigma and DMAIC is applied in this study

The process analysis of the process of onboarding minors is done by following the Lean Six Sigma framework with the DMAIC approach. Firstly the process has been defined and all the steps within the process has been charted by working closely with an onboarding specialist. The process definition has then been illustrated as a process chart.

The process chart was used as the basis of the data collection and the measurements. The data points of the process chart was converted to a spreadsheet using Excel. To gather the needed data, the onboarding specialist used the Excel spreadsheet to gather a timestamp for each part of an onboarding case.

These timestamps were used to measure the time spent on each step, and the time between each step. This process was repeated for 20 onboarding cases to get a larger data-sample.

More data was collected through the timestamps provided by the CRM system and the core-banking system to get a larger, but a more narrow data set, which could be used to outline trends in the process cycle.

After the data was collected, the data was analyzed and processed to calculate an average and a median of the time spent on manual labour, the time between each step and a total lead time.

Based on the trends found during the analysis of the data in both data set one and two, improvement suggestions were made.

This study includes suggestions how to further measure future performance and verify the effectiveness of the updated process. This part serves as the control part of the DMAIC approach.

3.7 Reliability

The reliability of the results in this study come from the structured approach by using the Six Sigma and DMAIC method and collecting data systematically in collaboration with an onboarding specialist. By repeating the data collection with the use of the process description and process chart, approximately the same results. (Heale and Twycross, 2015)

The collected data aims primarily to highlight trends and identify bottlenecks within the process. The time span of the collected data is also limited and doesn't take into account seasonal and periodical fluctuations in the amount of service request received by the bank. This could possibly reflect on the availability and the workload of the data collector, and in extension the efficiency of the measured process. Seasonal fluctuations and workload of the data collector would in extension affect the reliability of the data collection if the measurements would be re-collected. In addition, cases measured outside a controlled measurement area can have deviations that might affect the overall time measurements.

3.8 Validity

The data collected for the study was systematically resourced by using a pre-defined process description. Data set one includes 20 onboarding cases, which is approximately the amount of cases received by the bank during a one-month period. Data set two, which is used to validate the common trends in data set one, includes 40 cases which represents two months of onboarding cases. This amount of cases was chosen due to the limited time of the data collector.

A more diverse data set with onboarding cases spanning over a longer period of time would cancel out workload fluctuations of the data collector and any seasonal fluctuations. Only one data collector was used due to the process design. The measured onboarding process is design so that the process is heavily reliant on a small amount of process specialists. To correspond with this process design only one data collector was used to more accurately take this element into account.

3.9 The authors' role in the study

This study serves as a case study, and the authors' role is that of an objective observer of the process. The author has no active contact of the measured process outside this study. A process expert working at bank used in the case study was used to consult on the process flow and to collect the data.

The relationship of the author and the measured process, in an accuracy point of view, could possibly lead to a more shallow understanding of the process as a whole, and how the process compares to similar processes inside the organization. The use of third party who collected the data also means that the author has less control of the data collection process, which could lead to deviations in the data quality.

4 RESULTS

The current process of onboarding minors has been digitalized during recent years and can now be completed without visiting a branch office. Since the introduction of online document signing, the process has been made more streamlined to support a digital environment. It's recommended that at least one guardian is an existing customer at the bank. To be able to sign the needed documents and mandates the minors guardians or guardian needs to have a online banking codes issued by a Finnish bank. If these requirements are met the process can be completed. However, an online banking agreement with an identification function (TUPAS) cannot be issued without a visit to a branch office.

The process starts with the guardian or guardians being in contact with the bank. The representative taking the order will then provide information to the customer how the process is done. During this contact the bank representative identifies the customer through the phone-identification process which is completed using online banking details.

The bank representative then collects information on the guardians. This includes their names, social security number of the identified customer and information on the minor (names and social security number).

The representative collects information on which services to open. This often includes a savings account, a current account and possibly a payment card (depending on the age of the minor). If a card is applied for, information of the card details are collected.

When all the information is collected, the bank representative sends the information to the back office where the application is handled. Before any services are opened the guardians needs to fill out the needed mandate for the minor so that the services can be opened correctly

with the right permissions. The KYC form is also needed so that the correct information on the minor is collected.

These forms are filled out through the banks' webpage. The guardians need to fill out the needed forms before any services can be opened. The KYC form and the mandate for the guardians are signed through an online signing platform with the guardians online banking details. When the forms are filled out and documented the services can be opened.

This process usually takes one to three banking days depending on how fast the guardians fill out the needed forms.

4.1 The current process

The current process of onboarding a minor consists of a series of steps that include multiple customer initiatives and interactions, as well as manual labour. Although improvements have been made to the process and the process itself has been digitized no automation has been implemented so far. The processed measured here only includes cases where at least one of the minors guardians is an existing customer and both of the guardians have a valid internet banking agreement that can be used as an identification method online. The measured process consists of 22 different steps where three of these steps is dependent on customer initiative. The process is broken down to smaller steps in this case as to make the measurements more accurate.

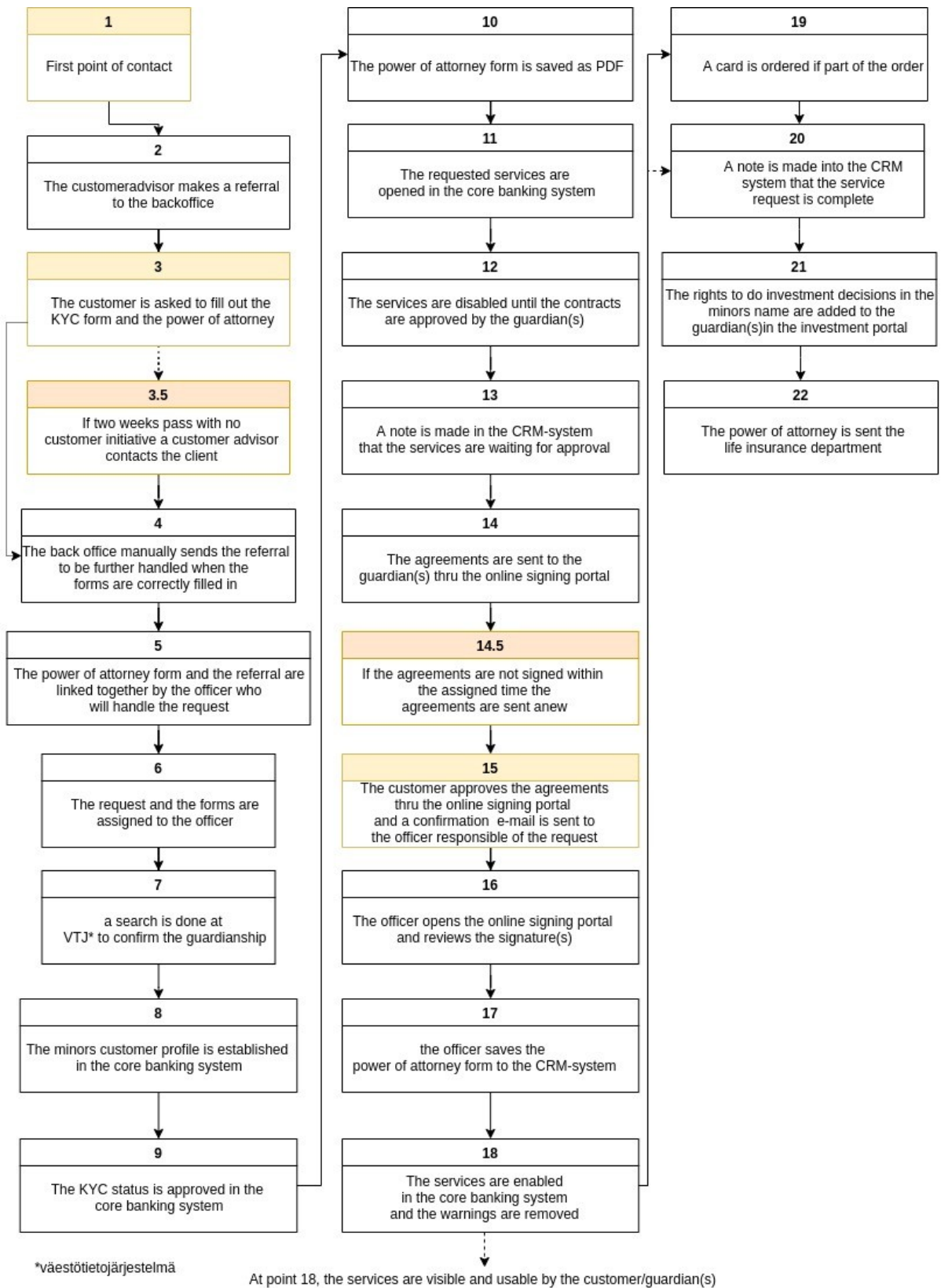


Figure 3: Process chart of the current onboarding process

4.1.1 A closer description of the process

1.

The onboarding process starts when an existing customer requests that services be opened for a minor. The first point of contact, for the most part, is by a message through the online bank. Another possibility is through the customer service by phone or if a family is switching banks and services are opened for all family members. The first point of contact in the latter example can then be through the branch office or any of the above-mentioned.

2.

During the initial contact the officer who handles the request will make a referral to the back office where it will be added into the request queue. The referral includes the minors personal information as well as the guardians' information, as well as which services need to be opened. The referral is usually filled in and sent to the queue during the first contact, but can in some cases be sent at a later date. This can be the case if the first point of contact happens at a branch office.

3.

Either in connection with or directly after the referral is sent the customer is instructed to fill in the KYC-form and the power of attorney form online through the banks' webpage. This step requires the guardian(s) to provide their personal information and contact details as well as how the guardian(s) can utilize and have access to the minors services. During this step the minors KYC-form is filled out. The form requires information about the minors address, country, and place of birth, possible incomes, political status (PEP), taxation information, possible wire transfers outside and inside the EU and the minors funds place of origin. When the forms are filled in they're signed using online banking codes. If there's only one guardian one signature is enough. If there's two the forms are sent to the other guardian for approval. In practice. The other guardian will get a link to the signing portal where the forms are signed.

3.5.

If the guardian(s) haven't provided the needed information in about two weeks time after the referral was sent by the officer a reminder call will be made.

4.

When the power of attorney and the KYC-form is signed and approved the referral is manually moved from the referral queue to be further handled.

5.

The correctly filled in forms and the referral is manually linked together to form a case.

6.

The case itself along with the forms are then assigned to the officer who will complete the onboarding process.

7.

To confirm that the reported guardianship are correct a query is done through VTJ (Väestö-etojärjestelmä). VTJ is a portal where financial institutions and other authorities can confirm personal information such as the address, information on possible children and who their guardian(s) are. This query is done through VTJ:s company portal.

8.

A customer profile is established in the core-banking system. This step includes manually opening the core-banking system and manually fill in the minors personal details.

9.

The KYC-status is marked as approved in the core-banking system. This is also manually done within the core-banking system.

10.

The power of attorney form is saved as a pdf-document for future handling. This step is done manually by downloading the signed form from the signing portal.

11.

The requested services are then opened in the core-banking system. Every account needs to be opened separately. For every account the correct rights need to be assigned in accordance to the power of attorney. This step's manual workload increases with every added service. During the opening of the services the corresponding agreements for every account are saved as a pdf-document. If a card is a part of the service request, the card will be ordered when the card agreement is signed.

12.

The opened services are then disabled by adding a warning label to every opened account. This is done manually for each of the opened accounts.

13.

A note is made in the CRM-system informing that the opened services are disabled until the agreements are signed. The note is made so that other banking personnel can act accordingly if a custodian or a guardian has questions regarding the process.

14.

The agreements are then sent through the signing portal to the guardian(s) for approval. This step includes manually opening the signing portal and adding the agreements that need to be signed. The recipients are added by manually inserting their personal identification number to the recipient field in the signing portal.

14.5

If the agreements are not signed within two weeks the signing request will expire. In this case the officer handling the request makes a reminder call and sends a new signing request by repeating step 14.

15.

The customer approves the agreements through the online signing portal. To sign the agreements the customer needs to login to the signing portal with their web banking codes. Once logged in, each agreement are displayed and can be downloaded as a pdf-document. The agreements are then signed by using the web banking codes. This step is repeated by each guardian. For each signature a conformation email will be sent to the officer who sent the request. When all the needed signatures are received the process can continue.

16.

When the signatures are received the offices will manually open the signing portal and review the signatures.

17.

The earlier saved power of attorney form is then uploaded and saved into the CRM-system. If a guardian wants to make changes to the minors services at a later date the power of form needed for these changes are readily available. The document is uploaded to the CRM system by opening the minors' customer profile where the file is then saved.

18.

The services are enabled in the core banking system. This step includes manually removing the warnings for each account in the core banking system which were added in step 12.

19.

If a payment card was a part of the service request it's ordered through the payment card portal. This is done manually and ordering process includes setting the cards' security settings,

delivery address and then sending payment card agreement as a copy to the guardians web bank.

20.

When all the services are opened and are available to all parties a note will be made in the CRM system that the onboarding process is complete.

21.

If the attorney of power includes rights for the guardians to do investment decisions the necessary rights are added to the investment portal in each guardian's name.

22.

As last step the power of attorney is sent to life-insurance department if the form includes the rights for the guardians to make and handle possible savings insurance agreements.

The process in general includes the 22 aforementioned steps, but the process can vary depending on the customer. Some steps are redundant if the minor only has one guardian. Other variations are the lack of a payment card order or missing rights for the guardians to do investment decisions. In these cases, the corresponding steps will not be a part of the process.

4.2 Measuring the process

The process of onboarding minors is, in this study, measured by how much time each step takes in form of manual workload, the total cycle time from first point of contact to available services and how much waiting time there is between each step and how much time there is between each step that requires customer initiative.

This measurement has been made by analyzing two data sets. The first data set follows the above-mentioned process chart where a bank representative has actively measured how much time each step takes in the form of manual labour. This data set consists of 20 onboarding cases. To further analyze the cycle time and the waiting times between customer initiative a

second data set is used. The data points in the second data set has been collected from the CRM system as a quantitative data set.

4.2.1 Data set one

The first data set consists of 20 onboarding cases where each step of the process has been measured in minutes to determine how long each step takes in manual labour. The data sheet to where the data points has been recorded follows the process chart presented in chapter 4.1.1.

The data has been recorded over a period of eight weeks and includes a total of 20×20 data points. The data has been recorded in cooperation with a banking official who is responsible for completing onboarding cases for minors. Some data points have a recorded time of under a minute. These data points will be averaged to 0.5 minutes. The aim for this data set is to analyze the manual labour in more detail to identify possible bottlenecks and to better understand which part of the process is labour-intensive.

4.2.2 Data set two

Data set two consists of data collected from notes and said notes timestamps from the core banking system and the CRM system. This data set is derived from a total of 40 onboarding cases between August 2020 and November 2020. This data set aims to further analyze the total lead time and pinpoint possible bottlenecks and the waiting time between customer initiatives. A second data set is used to validate trends seen in the first data set. The data points in this data set consist of:

1. First point of contact.
2. When the referral for opening of services was made.
3. When the customer profile is opened in the core banking system.
4. When the services are opened.

5. When a correct filed KYC form is received.
6. When the power of attorney is signed and received.
7. When the service agreements are sent.
8. If and when a reminder call is made.
9. When the service agreement are received and signed.
10. Total cycle time.
11. The time between first point of contact and an approved power of attorney form.
12. Time between sent agreements to opened services.

4.2.3 Lead time median and average in data set one

The average lead time in average for the onboarding cases in data set one is 29533.35 minutes, which translates to 20 days 12 hours and 13 minutes, and the median lead time is 22746.50 minutes, which translates to 15 days, 19 hours and 4 minutes. These lead times include the waiting times between customer initiatives as well as weekends. Other factors to take in consideration is if signed agreements or forms has been returned outside office hours. In these cases the process only continues the next banking day.

4.2.4 Lead time median and average in data set two

The average lead time in average for the onboarding cases in data set one is 41614 minutes, which translates to 28 days 21 hours 34 and minutes, and the median lead time is 38830 minutes, which translates to 26 days, 23 hours and 10 minutes. This data set also includes weekends and situations where agreements have been signed an returned outside office hours.

4.2.5 Waiting time between steps

This measurement aims to find how long each step take within the process to find possible bottlenecks that can further explain the lead time. The following table illustrates, in minutes the average and the median time between each step in the process. The steps follow figure number two presented in chapter 4.1. The step numbers with brackets represent customer initiatives.

Duration between steps	Average	Median
(1) →2	17930.45	10452.00
2 →(3)	5495.50	1169.00
(3) →4	355.40	68.50
4 →5	1462.80	1200.50
5 →6	209.85	0.00
6 →7	874.70	125.50
7 →8	356.30	5.00
8 →9	2.90	1.00
9 →10	2.61	1.00
10 →11	9.72	7.50
11 →12	4.20	3.00
13 →14	2.80	1.00
14 →(15)	16.95	2.50
(15) →16	1100.94	989.50
16 →17	1.42	1.00
17 →18	5.06	3.00
18 →19	1.50	1.50
19 →20	1.50	1.50
18 →20	3.00	1.00
20 →21	15.10	3.00
21 →22	16.37	0.50
1 →15	28503.39	22006.44
1 →3	22971.85	10786.00
3 →15	6184.36	2987.00

Figure 4: A table that depicts time between the steps in the onboarding process; Data set one

As seen in this figure the time between steps (1)-2, both the median and average, is quite high when considering the overall median and average lead time. This is due to the fact that many of the onboarding cases in this data set has their first point of contact as a message over the

web bank. In these cases the person making the request is asked for more information. This information includes the minors personal information and which services to open. This information is asked in form of a reply to the first message which makes the waiting time, until the actual referral is made, longer. In data set two, where there is a more diverse sample of cases, the median, and average between steps (1)-2 is shorter median 4152 and average 12756. This can be explained by the fact that data set two includes more cases where the first point of contact is made over the phone or at a branch office. If the service request is made in person the information exchange and the service request is done in real time and thus the referral can be made directly after the first point of contact.

The largest portion of the whole cycle, starting from first contact to the end of the cycle, is the waiting time between the customer initiatives. As seen from figure 3 the average time between step 2 and (3) is 13.2% of the total lead time. If we look at the combined steps of first point of contact (1) to the point where the power of attorney form is received (3) the overall average time between the two is 22971.85 minutes or 55.2% of the total average lead time.

The time between step (15) where the agreements are signed and 16 where the officer continues the onboarding can be explained by looking at the time when the agreements were signed. In some cases the agreements were signed out of office hours which adds to both the overall median and average lead time. Another factor is the officers' ability to directly respond to the signed agreements. In some cases a signed agreement had been received during office hours and the onboarding continued either a few hours later or during the next banking day.

Data set two, which includes a more narrow set of data points but in larger quantity follows the same trends.

Lead time in minutes
Median
38830
Average
41614
Time between first point of contact and approved "power of attorney form"
Median
32931
Average
53305
Time between sent agreements to opened services
Median
4222
Average
11468
Time between first point of contact and referral made
Median
4152
Average
12814

Figure 5: A table that depicts time between the steps in the onboarding process; data set two

4.3 Time spent on manual workload

When looking at data set one, we can see that the bulk of the total lead time is focused on the waiting time in step 3.

Steps nro,	Duration in minutes per step	
	Average	Median
1	0	0
2	0.5	0.5
3	11676.2	9847
3.5	188.1	0
4	0.5	0.5
5	143.3	2
6	0.5	0.5
7	1.1	1
8	4.6	4
9	0.7	0.5
10	0.9	1
11	4.5	3.5
12	1	1
13	0.9	1
14	7.9	2
14.5	0	0
15	0	0
16	0.9	1
17	0.9	1
18	2.6	2
19	0.5	0.5
20	1	1
21	2.8	3
22	0.8	0.5
Total	12040.2	9873.5
Excluding idle time	364.0	26.5

Figure 6: A table that depicts time spent on each step in the onboarding process; data set one

The total time spent on each onboarding in average is 12 040.2 minutes and the median is 9873.5. If we exclude the idle time in step 3 we can see that the total drops significantly to a total of 364 minutes average and 26.5 median.

This indicates that a large portion of the onboarding process is spent on waiting for customer initiative. Even though the manual workload per step in the onboarding process is seemingly low (median without idle time is 1 minute and average 15.2 minutes) the manual workload is accumulating with each onboarding.

Data set two consists of 40 onboarding cases collected during a period of 119 days. The yearly total of received onboarding requests is not measured in this study, but if we use the collected data and project an average of onboarding cases per year we get. $40/119 = 0.336$ per day, which means that the yearly amount would be 365×0.336 which amounts to 122.64.

This would mean that the total time spent on manual labour would be an average $122.64 \times 364 = 44\,640.96$ and the median $122.64 \times 26.5 = 3249.96$

4.4 Trends within the data sets

From both data sets we can see that the largest portion of the total lead time is the idle time between the first point of contact and the time when the KYC form and the power of attorney form is received. Another trend is that the continuity of the process is heavily dependent on the banking days and the office hours. Another redundancy, as well as a dependency issue is the fact that the larger part of this process is based on manual labour and is thus dependent on the officer handling the case. As we can see in the data, when a form or a signed agreement is received the process continues only after handling officer is able to continue the process. Depending on when the agreements or forms are signed this can take up to a few hours to a few days. If a form or an agreement is signed outside office hours the process continues the following day. If they are signed during a weekend the process continues on the next banking day, which further prolongs the waiting time.

5 DISCUSSION AND IMPROVEMENT SUGGESTIONS

The results of the analysis on the onboarding process shows that there is room for improvements when it comes to efficiency, redundancy and time sensitivity. These improvements can be achieved by applying process automation and by streamlining the process to minimize idle time and identified bottlenecks. By using the analyzed data on the process, a set of improvements will be proposed. The improvement suggestions will be based on the analyzed data as well as earlier research on process automation and customer experience.

5.1.1 Streamlining the process to minimize idle-time

As established from the analysis of the data, the waiting time in the beginning of the process is quite substantial when considering the total lead time. This idle time can easily translate to a bad customer experience. This is due to the fact that the process is started, for both the bank and the customer, at the time of the initial service request. Waiting time is common when opening services. A waiting experience tends to be perceived negatively and have been known to affect customers' overall satisfaction with the product or service. (*DMAIC: The Complete Guide to Lean Six Sigma in 5 Key Steps | Process Street | Checklist, Workflow and SOP Software*, no date)

David H Maister described in his article "The psychology of waiting lines" in 1985 that pre-process waits are perceived as longer than in-process waits. (Maister, 1985) In this case the actual process of opening the services starts after the customer has provided the bank with the correct forms. This means that the waiting time before the received forms can be perceived as preprocess wait, and is thus perceived as a longer waiting time.

The bank accepts and acknowledges the service request at the time of the first contact. This means that the customers perceived waiting time starts at that point regardless of when the process can continue. The process continuity, at this stage of the process, is dependent of customer action. In other words, when the KYC form and power of attorney form is filled in and received by the bank. Even though, there is a service request made in the form of a referral to the back office the process is idle during the waiting time.

Another part of David H Maisters theory is that unexplained waits are longer than explained waits (Maister, 1985). In the context of the onboarding process, this means that if the customer forgets or misunderstands the instructions on how to fill in the required forms the waiting time can turn to unexplained waiting time. This, in turn, translates to bad customer experience.

Because there is a referral made at the first point of contact, resources must be reserved for following up the process status in forms of reminder calls or internal follow-ups.

As seen in the data, the waiting time between the first point of contact and the received forms is the largest portion of the total lead-time. This trend suggests that this part of the process needs to be improved. Another trend in process measurements was that the actual opening of the services are made available manually when the signed agreements are received. When the signed agreements are signed outside office hours or during a weekend or a holiday, the process can only move forward the next banking day. In conjunction with the manual steps of making the services available this prolongs the waiting time. The data also reveals that the opening of the services tends to be dependent on the handling officers workload and presence. If the handling officer is unavailable or the officers workload permit immediate action the waiting time will extend further.

This suggests that the process of opening the services needs to be improved to shorten the waiting time and make the process less dependent on manual labour.

5.1.2 Automation of the onboarding process

The process in its current status is manual labour-intensive. Each step in the process has a manual element to it and needs active input from a human resource. As described in chapter 2.5.1; Processes that are rule-based, can be defined and is repeatable, tends to work best as candidates for automation. The onboarding process in general, where both guardians have viable online banking agreements, and where at least one of the guardians is an existing customer, is very predictable and tends to follow the same patterns.

The use of non-Invasive – RPA implementation could effectively remove the need for manual input and improve workflow redundancy. Non-Invasive – RPA is designed to mimic human action. This means that a automation robot can interact with existing systems and applications without. This allows implementation of RPA without making any significant changes existing legacy systems.(Devarajan, 2018)

The automation of the onboarding process would also give the process more scalability and be less dependent on the back-offices available human workforce. The automation of the process would also mean that the opening of services would be time-independent. Time in-dependency would, in practice, mean that services could be opened outside office hours and during holidays.

Overall the automation of the onboarding process would reduce waiting time and the total lead time of the process. This in turn would minimize both the perceived and the unexpected and thus improve the customer experience.

The use of a non-invasive RPA bot would also free up human resources to other functions, which would reduce the cost of each onboarding. Reliability and accuracy would also be a benefit since the bot would follow a preset of rules which would eliminate human error.

The process in its current state and form is not necessarily fit for the implementation of RPA. The process would need to be reconfigured to better support automation and to reduce the amount of customer interactions from both parties.

5.2 Reconfiguring the process to support RPA

For the process to better support the implementation of RPA and to reduce the amount of customer interaction the following things should be reconfigured in the process.

5.2.1 Concentrating customer input to the beginning of the process

To reduce the amount of customer input and customer initiative, all customer contact needs to happen in the beginning of the process. This could be done by establishing a customer portal

where the service request could be made as a whole. This means that the customer would fill in the KYC-form and the power of attorney, form, select which services to be opened, select the services' security features and sign all the needed agreements at the same step. The current process has these steps separated into two different steps, which in turn adds both manual labour and initial customer input. The requirements for signing the documents with the valid web banking codes would not change.

An important feature for the online portal would be that all information about the minors and the status of the guardianship needs to be checked before the customer can send the service request to the bank. This would reduce the need for manual screening and possible contact to the customer.

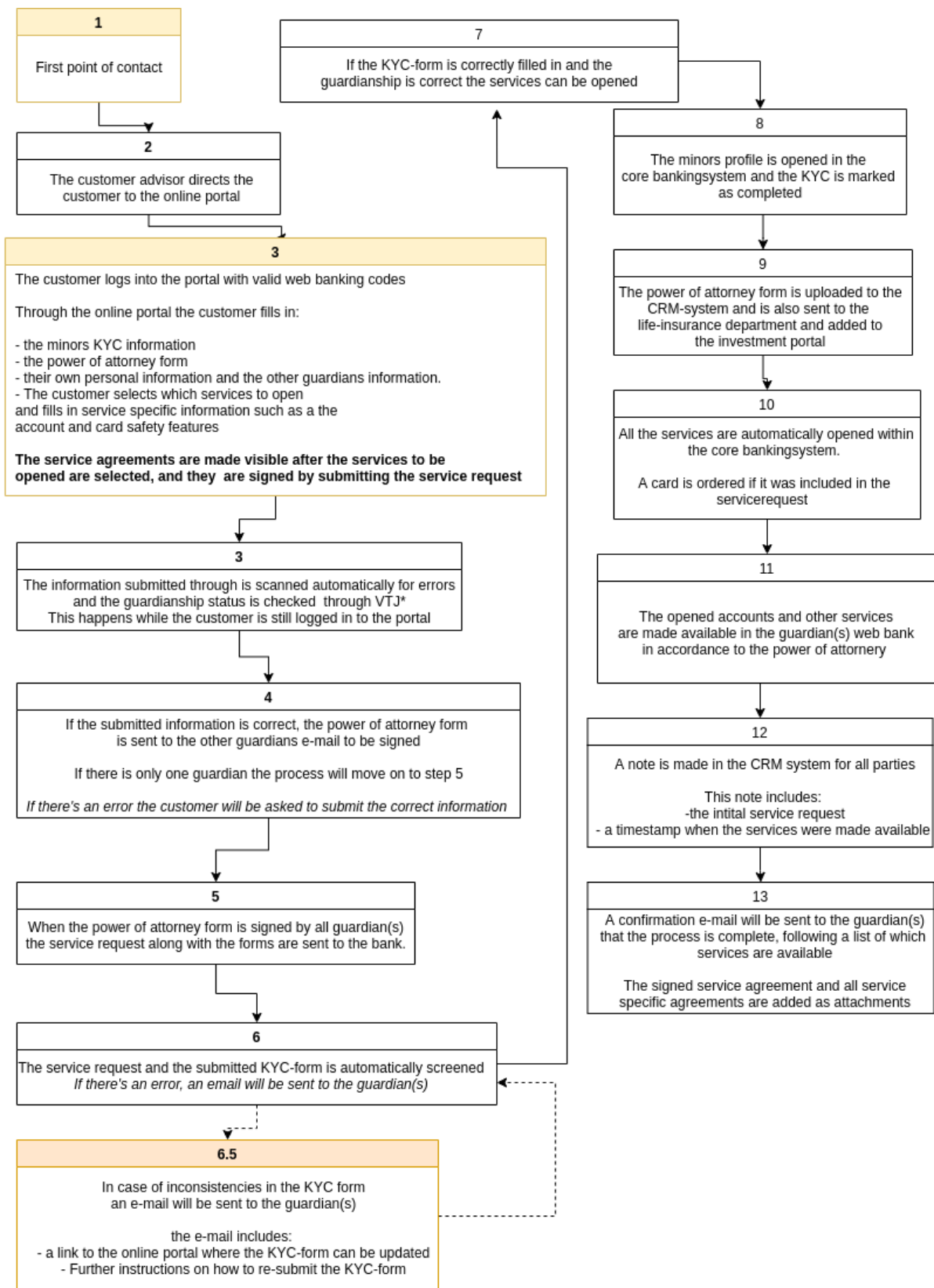
By concentrating the customer input to one step would mean that the service request received by the bank includes all the information and required signatures for the services to be opened.

This improvement also eliminates process idle time and total lead time. A service request referral would not be made upon first point of contact, and later be idle until all forms are received. This approach would remove the measured trend in the process current state, where the idle time makes up almost half of the total lead time.

5.2.2 Reconfiguring the process flow

If a service request, which includes all the information and required signatures several steps of the current process can be eliminated or consolidated. This would essentially mean a shorter process span and a shorter total lead time.

The original process consisted of 22 steps where all the steps, excluding customer initiative, were based on manual labour. The reconfigured process consists of 13 steps where all the steps are automated. If the provided data and the service request is correct, there's no need for human intervention. In case of errors or process failures human intervention is needed. The process chart below further describes the improved process flow.



*väestötietojärjestelmä

At point 11, the services are visible and usable by the customer/guardian(s)

Figure 7: Process chart of the improved process

The process starts with the first point of contact which has the same characteristics as the current process. This can happen over the phone, through the web bank or through the branch-office.

From this initial step the customer is directed to the online portal where all needed information is provided. If the first point of contact is made at the branch-office, the services can be opened manually.

As seen in figure 7, the process chart follows the same principals as the current process without additional customer input after step 5. If step 6.5 is needed, manual intervention might be necessary if the customers needs further instructions from the customer service.

If step 7 in the process chart is deemed successful, all further interaction with the CRM-system and the core-banking system can be automated through non-invasive RPA. This automation is only possible if there's good quality data input, in form of the initial service request, and a reduced amount of customer contact.

This approach to the automating the process would save a significant amount of time that is currently spent on manual labour, and free up human resources to other tasks.

5.3 Controlling the improvements

To control and evaluate process performance after a RPA process implementation a long-term follow up is needed. To effectively measure the improved process the new process needs to be measured by using the same measurements initially used in the process analysis. This will provide comparable results and make the improvement analysis more accurate. When designing the process all parties involved in the onboarding service chain needs to be included so that final design includes all the necessary steps.

A test period of the process must be conducted in a controlled environment needs to be conducted. The testing time needs to be long enough to gather comparable measurements so that an informed conclusion on the process performance can be made.

After the initial test period the process design needs to be re-evaluated based on the collected data, by the initial process design group.

6 CONCLUSION

The analysis of the onboarding process in this case study suggests that there are several improvements that can be made. The process is heavily dependent on manual labour and there are instances where the process is idle due to customer initiative. Because the process need active human input, it lacks redundancy and is prone to halt during holidays or when there's a workforce shortage. This, in turn, affects the process scalability and efficiency. Manual labour is also cost in-efficient and locks in resources that could be used for other tasks.

By re-designing the process so that it supports the use of RPA and reduces unnecessary idle and waiting time, the total lead time, cost efficiency, and scalability can be increased while increasing the overall customer experience.

6.1 Implications of an RPA process approach

The limitations of an automated approach to the onboarding process is that is dependent on a standardized workflow. The RPA bot would not be able to handle requests that deviate from the standard form. In these cases there needs to be available resources to handle these requests manually. The RPA bot would need to be configured to identify these kinds of deviations and be able to send the requests for manual processing.

RPA automation is based on process workflow. RPA automation, in itself, is easily updated without systematic software updates, but if the process design is flawed or needs an update the process itself needs to be re-evaluated. Process re-evaluation and re-design is, compared to an RPA update, very resource heavy, and it can take a significant amount of time. This puts an emphasis on the initial design of the onboarding process.

Another limitation of this approach is the lack of creativity. If a customer has a need that doesn't fit the preset of rules applied to the RPA process the onboarding needs to be done manually.

The baseline of this process design, and the preset of the process analysis in this study, is that both of the guardians needs to have valid web banking codes to be able to sign the needed documents. If this is not the case the process needs to be done manually by signing the documents physically at a branch office. This is currently the case with the current process, so it's not a limitation in its own right, but it still underlines the fact that the onboarding of minors cannot be completely automated.

6.2 Future research

The scope of this study was explicitly on the onboarding of minors in a Finnish retail bank. The data samples used to establish the trends and to describe the process were narrow and represented a qualitative approach to the research question. Further research could expand on the onboarding of, not only minors, but all customers and how RPA could be implemented in similar cases on a larger scale. A broader approach to the automation of customer onboarding could be used to further research how improve process efficiency and what effects on customer experience this could have. New automation technology and the implementation of machine learning and artificial intelligence within processes are emerging fast within the industry, and these future technologies could be applied as a possible approach in future studies.

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