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**Evaluating Lean Six Sigma Implementations in Financial Services
using Soft System Methodology**

Blerim Islamaj

A thesis submitted in partial fulfillment of the requirements of
Sheffield Hallam University
for the degree of Doctor in Business Administration

October 2021

Candidate Declaration

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1. I have not been enrolled for another award of the University, or other academic or professional organization, whilst undertaking my research degree.
2. None of the material contained in the thesis has been used in any other submission for an academic award.
3. I am aware of and understand the University's policy on plagiarism and certify that this thesis is my own work. The use of all published or other sources of material consulted have been properly and fully acknowledged.
4. The work undertaken towards the thesis has been conducted in accordance with the SHU Principles of Integrity in Research and the SHU Research Ethics Policy.
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Name	BLERIM ISLAMAJ
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Abstract

This thesis explores Lean Six Sigma (LSS) implementations in financial services by using Soft System Methodology (SSM). Financial Services are among the top five contributors in world economies. They currently operate in a challenging market and are under tense pressure to innovate and stay competitive. By nature, financial services, are bound by time in terms of processes that lead to an outcome that benefits customers. To maintain the competitive advantage, they must minimize the operational inefficiencies by adopting the different qualitative initiatives. One of the most prominent initiatives applied in financial services last two decades is Lean Six Sigma.

The research revealed the LSS is much appreciated in financial services. During empirical analysis, the researcher managed to bring forward the main stakeholders involved, reasons why LSS was triggered to start, and identified some of the issues associated with these projects. Among many tools, Kaizen events were considered the most efficient approach of LSS, whereas the improvement stage of the methodology was occasionally perceived as a daunting task.

The participants involved in the primary research were from Banks, Fintech, and Shared Service Centers. They were representatives of financial services located primarily in Europe and Asia as well. The research provided a holistic view of LSS projects in financial services following the Soft System Methodology approach. Findings went beyond from general barriers mentioned in the literature. While the commitment from Top Management or other important stakeholders is the main reason for the success of LSS, the empirical research underpinned the exact areas where the commitment has mainly to come from. The study informs the practitioners that before starting the LSS project, they have to ensure full ownership in all D-M-A-I-C stages. This would come from commitment or a more flexible and agile mindset between the LSS project team and IT to implement the changes. Research findings move the LSS beyond the cliché of manufacturing reference.

The research showed that the use of SSM as an interpretative approach for evaluating participants' perceptions in LSS projects was highly valuable. It also provided additional insights that practitioners can leverage SSM as a problem identification method in the future. Synergies between the soft system thinking principles of SSM in having a

practical SSM standalone methodology or blended Soft Six Sigma, Soft Agile, and LSS Agile provided additional lenses for future academic and practitioner's researches.

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I am also incredibly thankful to all participants that took part in the primary research. Regardless of the pandemic and their busy schedule, they took their time away to help me. Their participation was pivotal for the success of the study, and therefore the contribution was exceptional.

I dedicate this thesis to the memory of my father, Eng. Feriz Islamaj. He'd always been very fond of postgraduate studies and would have been proud of me for my latest progression in Doctoral Program. His values, legacy and memory will continue to shed light in every aspect of my life.

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List of Abbreviations

AI	Artificial Intelligence
CFF	Critical Failure Factor
CSF	Critical Success Factor
CST	Critical System Theory
CTQ	Critical to Quality
DMAIC	Define-Measure-Analyze-Improve-Control
GST	General System Theory
LSS	Lean Six Sigma
MIFA	Material and Information Flow Analysis
OM	Operation Management
OR	Operation Research
PAM	Purposeful Activity Models
PDCA	Plan-Do-Check-Act
PI	Process Improvement
RD	Root Definition
RQ	Research Question
SIPOC	Suppliers-Inputs-Process-Output-Customers
SPC	Statistical Process `Control
TQM	Total Quality Management
VOB	Voice of Business
VOC	Voice of Customer
VSM	Value Stream Mapping

Chapter 1. Introduction

1.1 Background

The thesis "Evaluating Lean Six Sigma implementations in financial services using Soft System Methodology" was written by Blerim Islamaj, hereafter the researcher. He has been working for thirteen years for large international financial services in the banking industry. Once he started his full-time Doctor of Business Administration (DBA) program in early 2017, it took him more than four years and a half to come up to the thesis submission stage. This chapter aims to give an overview of the research, the background of the thesis, the rationale, the aim, research questions, objectives, and the research structure. Right after the introduction chapter, the researcher briefly explains the importance of practice. This passion has motivated him to contribute to the problem identification and process improvement methodologies for financial services.

The researcher prepared the thesis in partial fulfillment of the requirements of Sheffield Hallam University for the degree of Doctor in Business Administration. University research Degree Committee approved the proceeding to the thesis stage in May 2019. Participants' interview process lasted for over one year and a half, where the pandemic, like with everything else, turned the data collection activity more challenging than anticipated. The researcher transcribed the participants' interviews verbatim, analyzed the obtained data, prepared the findings and reflected on each case study individually, summarized the limitations, contributions in literature and practice, and completed the thesis with his recommendations for future researches.

Given his background and extensive professional career, the researcher's choice to pursue a DBA program rather than a Ph.D. sounded natural (MacLennan et al., 2018). Sometimes the difference between DBA and Ph.D. is the motivation behind the studies. For most Ph.D. students, that path leads to an academic career. Whereas for DBA researchers, their contribution needs to be twofold: theory and practice (Graf, 2020). Different authors have underlined the tension between academia and practitioners, leading to a division (Bartunek & Rynes, 2010; Sarstedt et al., 2018; Tucker & Lowe, 2014). This gap is taken for granted nowadays, with both claiming that there is no intake enough from either party to satisfy each other needs (Perea & Brady, 2017; Williams, 2014)

Usually, the practitioners are particularly interested in solving their organizations' pressing problems that are naturally embedded in a particular context. While academics

seldom care about a specific context or industry, they want to generate generalizable knowledge (Andreassen, 2021). Publications on the topic and the domain chosen by the researcher are declining. Whereas the articles about the methodology used in his study to explore the subject are scarce, if not missing.

Therefore, the theme developed by the researcher on his thesis received appreciation and a growing interest from different scholars in the Doctoral Consortiums events. At the same time, participants were happy to take part in his study. What is missing is 'The Bridge' – that intangible connection between critical research and practice that often eludes both sectors (Field, 2021).

The researcher is from financial services, a practitioner background, who is very passionate about bridging this gap and contributing significantly to literature and practice. This passion drove him entirely throughout his research to ensure that practitioner was applying the appropriate principles accordingly from the knowledge and at the same time making sure that literature benefited and reflected the findings that emerged from his research. In the next section, the researcher will explain the rationale of his study and the approach he used to evaluate the subject matter further.

1.2 Motivation and Rationale of the research

Before starting his full-time doctoral studies, the researcher has worked in financial services for 13 years. He comes from a technical background and was always interested in improving banking back and front office operations. Researcher believes the information in literature for the topic he had chosen is inadequate. Findings and literature gaps supported his initial claims. Hence, he committed himself to help academia and financial services practitioners closely cooperate and address some of today's challenges. Once he completed the MBA, he was encouraged that his ideas could significantly contribute to practice and academia. For this reason, he pursued the DBA that while updating the literature, he could contribute to financial services as well.

“In the next 5 to 10 years, you’re going to see more change in the financial system than you have over the past 10 to 20 years”

”

Dan Schulman,

PayPal’ CEO, 2021.

Financial services operate in a hyper-competitive environment and continuously intense pressure to innovate and stay competitive (Karpik, 2018). In running their business, they always want to focus on customers to satisfy and fulfill their needs by increasing the quality of services and the number of products they offer (Aditya & Irawan, 2020). At the same time, they had to deal with the digital tsunami and the Covid 19 disruption that unexpectedly emerged last year (Rowe, 2021) to eliminate operational inefficiencies and maintain competitive advantages (Abner et al., 2020; De Mast, 2006; Majumdar, 2019; Vashisht et al., 2017; Zhuo, 2019).

Through the years, financial services like Bank of America, HSBC Holdings, City bank, Barclays, American Express, Standard Bank Group, HDFC, ICICI, Bank One comprising somewhere at 20% of world banking's costs (Calice & Zhou, 2018) have applied various quality initiatives to address operational inefficiencies and therefore differentiate themselves from competitors (Antony, 2014; De Koning et al., 2008; Grover, 2012; Taskar et al., 2017).

Some of the quality initiatives initially adopted by different companies were Total Quality Management (TQM) (Albuhisi & Abdallah, 2018; Al-Mansour, 2007; Ayyash et al., 2012; Tennant, 2017), Business Process Re-engineering (Cheng & Chiu, 2008; Riyanto et al., 2019; Seethamraju, 2012), Six Sigma (Antony, 2004; Chakraborty and Leyer, 2013; Heckl et al., 2010; Hollingshed, 2021) and Lean manufacturing (Buer et al., 2018; Sundar et al., 2014; Wilson, 2010). Though the last two, Lean and Six Sigma have their origins in manufacturing (Sunder, 2016), the late blended version of Lean Six Sigma (LSS) has been widely adopted in services operations (Altria & Smith, 2009; Antony et al., 2017; Ganesh & Marathe, 2019; Madhani, 2020; Sreedharan et al., 2020; Zwetsloot et al., 2018).

Services have been by far the most significant contributor to world economies. According to World Bank (2020) report, the share of the service sector has reached a level of 60 % of GDP in countries like the USA, Europe, and India. Within services, financial services are among the top five contributors in the respective economies

(Majumdar, 2019). They are often bounded by time in terms of the processes that are run and lead to the delivery of an outcome that benefits a customer (Sunder, 2013; Vashishth et al., 2019). Lean comes in as a methodology to reduce waste (in terms of time) in services organizations to make processes more efficient. It tries to examine the client's perspective to eliminate the inefficiency. In comparison, Six Sigma focuses on refining the process by reducing defects by continuously using advanced statistical tools (Delgado et al., 2010).

Snee and Hoerl (2003) have regarded Lean and Six Sigma as a method that can help financial institutions to improve their operational efficiency and effectiveness by combining the strengths of Lean thinking and Six Sigma. Lean does not possess the ability to provide statistical control on reducing the variation, and Six Sigma does not provide the necessary space for linking the quality and speed (Su et al., 2006). These two methods' combined application has led the financial services in better quality and efficiency (De Koning et al., 2008a). They are considered the most popular management strategies for enabling process improvement in organizations (Albliwi et al., 2015).

For instance, LSS has considerably helped the banks improve the efficiencies of their loan products (Pratik, 2016). LSS deployment helped the finance and financial services transform from operational to tactical and strategic (Madhani, (2020). In manufacturing, their degree of success is high, though the scale of success in services is limited (Alsmadi et al., 2012). The literature provides considerable evidence of cost reduction and other benefits from Six Sigma.

However, some authors argued whether these benefits sufficiently exceed the costs of adoption (Swink & Jacobs, 2012). According to Adams (2003), "doing Six Sigma training before project identification is the classic – getting the cart before the horse." Stories from companies like General Electric and 3M indicate that organizational leaders believe that Six Sigma practices may constrict innovation to drive growth (Hindo, 2007). Many Six Sigma programs failed due to the wrong selection of projects since not all qualify to run under the Six Sigma methodology (Sunder, 2013). Some articles have addressed the benchmarking of Lean Six Sigma methods in service industries, but those case study-based articles are few (Sreedharan et al., 2018).

Little evidence in literature continues regarding the introduction of Lean and Six Sigma in financial services companies. And from those researchers who attempted to assess and evaluate Lean and Six Sigma based on the milestone, function, and project-based methods, we still cannot find the evidence that validates an increase in revenue and

provide more effective risk management as LSS outcomes (Sunder et al., 2018). This suggests a necessity to build a theory of how Lean Six Sigma works in financial services (Chakraborty & Leyer, 2013).

Due to market complexity and limitations, the financial sector faces many more challenges implementing quality programs like Lean or Six Sigma (Mahmutaj et al., 2015). Several authors pointed out that financial services need a roadmap for implementing Lean and Six Sigma in this context. It is missing in current literature resulting in the lack of plausible theory (Buavaraporn & Tannock, 2013) and standard criteria to assess the project progress and complexity (Hsieh et al., 2012).

In addition, very little research has been carried out to show what infrastructure is needed to make Lean Six Sigma successful in the financial services sector (Vashishth et al., 2019). Besides, when deciding which continuous improvement method to choose, there is a lack of a holistic approach for the financial service sector. Some organizations select Lean as their primary continuous improvement methodology; some utilize Six Sigma, and others choose Lean and Six Sigma. There is no systematic framework available in the literature which guides organizations to pursue a suitable continuous improvement methodology for a given problem or scenario (Vashishth et al., 2017). Furthermore, the number of LSS publications for both manufacturing and services, in general, has experienced a steep decline in the last decade (Sreedharan et al., 2020).

Some authors have suggested that to understand better what's happening with Lean Six Sigma applications a holistic evaluation from a system thinking perspective is highly recommended (Sunder et al., 2018). Indeed, there is a significant research gap in understanding LSS from system thinking perspectives (Ganesh & Marathe, 2018). LSS has no tools to deal with soft aspects of the organization (Alblooshi et al., 2020).

Therefore, the researcher decided to use systems thinking principles and conducts a holistic evaluation of LSS implementations in financial services. Unlike other traditional analysis methods that break systems into separate elements for further analysis, systems thinking focuses on how systems' components interact and how the system works over time in the context of larger systems (Lutkevich, 2020). Theoretically speaking, systems thinking are complex, broad, and sometimes not easily understood by practitioners. Hence, Peter Checkland developed the Soft System Methodology (SSM) to bridge academia and practice (Checkland, 1981; Checkland & Scholes, 1990).

SSM is based on systems thinking and aims to improve areas of social concern by activating a never-ending learning cycle in the people involved in the situation (Von Bulow, 1989). It tackles complexity and real-life problems through multiple perceptions of different stakeholders rather than one single view (Checkland & Holwell, 1998). Unlike other systems methodologies, SSM provides a holistic view of the situation and primarily emphasizes problem identification and formulation rather than problem solution (Checkland, 1981; Checkland, 1990; Óskarsdóttir et al., 2017). While a lot of the emphasis in the literature is on design, Ballé (1994) argues that the essential aspect of an SSM is that it provides a discipline of thinking before making decisions in business by reducing the chances of incorrect identification of the problem (Kirk, 1995). It is a problem structuring approach (Checkland & Poulter, 2006).

The researcher considers SSM nature and its underpinning systems thinking root the best method to address the literature and practice gaps about LSS applications. As we look to the future, we see emerging trends that will demand organizations to improve. Globalization and its associated competitive pressures, customers demanding more in quality, service, and lower costs, complex unstructured problems are the trends that need better and seek more advanced improvement methods (Antony et al., 2017). The next section introduces research aims and objectives, followed by the thesis's structure and chapter summary.

1.3 Research Aim and Objectives

Following the research's gaps and rationale, it became naturally clear that the research's central question is to understand "*what was going on with LSS implementations in financial services?*". Thus, the main objectives helping to answer the primary research's question were:

Research Objectives

1.3.1 Objective One

To examine the literature of LSS publications in manufacturing, services in general and financial services in particular.

Research Question 1: What are the main challenges of Lean Six Sigma implementations?

Exploring LSS applications in a broader context other than financial services was very helpful for the researcher. The researcher learned about the history of Lean, Six Sigma, and Lean Six Sigma, their roots, and early applications in manufacturing and services. He also studied the main challenges faced by LSS in these domains and viewed some of the latest trends to understand the impact on improving the current situation.

1.3.2 Objective Two

To examine the process of LSS implementations in financial services using system thinking principles of SSM (see Appendix I).

Research Question 2: How has Lean Six Sigma been deployed and implemented in financial services?

This objective is the primary empirically focus of the research. Using SSM to evaluate various LSS implementations in financial services helped the researcher to understand how has LSS been deployed in financial services. Also he was able to identify the main stakeholders involved, explored the main issues and challenges that participant faced during the LSS projects, and learned what steps they undertook to improve their situation.

1.3.3 Objective Three

To identify main barriers and gaps of LSS implementations in financial services by using empirical research and matching them with literature review findings.

Research Question 3: What are the barriers/ gaps that make Lean Six Sigma in financial services less effective than manufacturing?

While critically evaluating and reviewing the LSS literature for financial services, the researcher was able to identify the main gaps on LSS projects, which constituted the rationale of the research. Using his empirical study, he underpinned some of the reasons causing LSS in financial services to be less effective than manufacturing. The objective is to benchmark findings from literature review and the empirical research, which really constitute the real contribution of research in academia and practice, but also made bold suggestions for future studies

1.4 Thesis Structure

The structure of the thesis follows a logical flow of the information. The next chapter will emphasize the significance of practice in research. The researcher believes that alongside with thesis introduction is very important to introduce himself and his experience in his DBA journey. He is so passionate about the topic he chose to investigate and. Narrowing down the gaps identified between the theory and practices and paving the way for further qualitative research to encourage practitioners to become involved in more academic studies. Since the research is DBA over the traditional Ph.D., the significance of practice is considered substantially but not locked entirely in.

Thus, chapter 2 briefly summarizes the importance of practitioners by shedding light on his passion for studies, his reflections about the study, critical moments of his DBA journey, and how his decision to follow this route helped him master new skills.

Chapters 3, 4, and 5 of the literature reviews will follow it, which covers the assessment of the financial services as the domain under investigation, the Lean Six Sigma the methodology under evaluation, and system thinking chapter that will provide discussions about the method, that carries the analysis. Chapter 5 will also summarize three chapters and the gaps identified in literature regarding Lean Six Sigma applications in financial services.

Chapter 6 describes and explains the ontological and epistemological approaches of the research methodology. It also establishes the rules of conducting primary empirical research by detailing the data collections process and ethical considerations.

Chapter 7 introduces the findings of primary empirical research. All cases studies were analyzed individually using Soft System Methodology explained in Chapter 7. Each case study contains findings, limitations, and the researcher's reflections on every individual case. The chapter closes with overall conclusions for all cases.

Chapter 8 discusses the contribution in literature and practice by benchmarking the findings in literature review and the empirical research against research questions and objectives—recommendations for future research and concluding remarks close the thesis. The list of tables, figures, and references follows the closing remarks.

To ensure the findings in each chapter were correctly recorded towards the research goal, the researcher introduced the research map at the summary of each chapter. In this way, the reader will find it easier to go through the thesis and not feel lost. In the next

section, the researcher will introduce the research-mapping table, which from that moment and on will be used as a reference and guide his research work.

1.5 Chapter 1: Summary

The researcher started chapter one by introducing the thesis and the rationale of his research, followed by research aims, objectives, and questions. He explained the structure of the study to help the reader to go through his study quickly. The research mapping table initiated in Table 1 below summarizes the aims and objectives of the research used by the researcher. The readers could easily use it to track and measure findings to meet the research goals.

Table 1

Thesis Mapping: Stage 1

Thesis Research Mapping (Stage 1) Research aims, objectives and questions.	
Research Aim	Main Research Question
The aim of the research was to explore LSS implementations in the financial services through literature review and empirical studies.	What is happening with LSS implementations in financial services?
Research Objectives	Research Questions
Objective 1: To examine the literature of LSS publications in manufacturing, services in general and financial services in particular (Chapters 4). Introduce an overview of developments in financial services as the context domain of the study (Chapter 3).	Research question 1: What are the main challenges of Lean Six Sigma implementations?
Objective 2: To use empirical research in various financial services and examine the process of LSS implementations by using systems thinking principles of SSM (Chapter 7)	Research question 2: How has Lean Six Sigma been deployed and implemented in financial services?

<p>Objective 3:</p> <p>Using literature review and empirical research findings to match the gaps, identify the reason why LSS is more successful in manufacturing and prepare the suggestions for further studies in order to address all remaining gaps identified in LSS implementations in financial services (Chapters 4 & 7). Use the information in Chapter 3 to validate findings in empirical research with latest developments in financial services.</p>	<p>Research Question 3:</p> <p>What are the barriers/ gaps that make Lean Six Sigma in financial services less effective than manufacturing?</p>
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(Islamaj, 2021)

The next chapter will discuss the importance of practice and its role in the research findings and recommendations.

Chapter 2. Importance of Practice

2.1 Introduction

While the researcher explained his study's rationale, aim, and objectives, he believes it is essential to introduce himself, underpinning some of the reasons that drove him to conduct this research. It will relatively be a short chapter that starts with a bit of rationale of his route towards the thesis alongside with researcher's motivation to contribute in theory and practice. He will also briefly summarize the critical moments of his DBA journey that helped him reach the most remarkable milestone of his studies submitting the thesis.

2.2 Towards the Doctoral Thesis

The researcher's core background is technical, with its primary degree in computer science. He spent most of his professional life working for financial services in technical and senior management roles. Coming from a financial services background, the researcher considers himself a practitioner in that particular domain. Therefore, following DBA research with a subject matter in financial services was an obvious choice. DBA was preferred over than Ph.D. since it requires contributing to literature and practice as well. Building bridges between practitioners and academic worlds was the prominent researcher's goal when pursuing a doctoral program.

Objectives 1 and 3 of the thesis helped update the literature with the reality of LSS applications in financial services, encouraging practitioners to work with academics to implement the findings and future research recommendations into practice. At the same time requires literature to reflect what's happening in practice harmonizing their views. The thesis has substantial practical and theoretical contributions. McKinnon (2013) noted that researchers shouldn't sit in their ivory towers trying to impress each other but prioritize practical relevance. And when it comes to practical significance, there should be no trade-off between rigor and the practical relevance of the research (Fawcett & Waller, 2011; Svanberg, 2020).

To have a meaningful, practical value of the research, it is crucial to relate it to today's practitioners' problems and use their real-life as a reference instead of applying a scholarly view to the situation (Brocke et al., 2021). Therefore, the researcher wanted to build a piece that can be used as a vehicle for cultivating and fostering curiosity-driven

research in helping practitioners in their daily activities and at the same time updating the literature with experience coming from practitioners. The study will explain the passion that drove him to carry out the research in the next section.

2.3 Passion for the study

The researcher reckons that it would have been difficult for him to pursue the DBA journey without a high level of motivation, which took him almost five years. It has had a massive impact on the researcher's private life, given that he chose to complete his studies in the full-time mode rather than part-time. Away from his family, friends, and colleagues. Therefore, it has been a challenging journey for the researcher dedicating himself entirely to his full-term studies. It was tough for his mental, physical, and financial health as well.

However,

"God never gives you a dream that matches your budget. He's not checking your bank account, he's checking your faith"

(Larche, 2016, p. 29)

The researcher's goal was to produce a piece that heavily contributes to practice and helps to bring closer the academic world to the practitioners' s lives. Alongside that, the researcher's passion for a degree from British Universities was another critical driver of embarking him in doctoral studies. His motivation was coming from within since he was emotionally attached to the UK education system, considering it as one of the best educational systems in the world. Coming from an East European country with a strong ex-communist inherits, where foreign literature was forbidden for a half of century up to the 90s, the love of the researcher for western and for British culture and education was even more robust.

In this context, the Doctoral studies were the best and probably the last opportunity for the researcher to have his dream come true. The choice was entirely passion-based to improve him continually and had nothing to do with post studies financial benefits or any career advancement. Despite having an executive MBA from the University of Sheffield, he always considered himself unfulfilled in his academic background. Therefore, as soon as he completed his master studies in early 2016, he immediately started preparing to extend his knowledge in doctoral levels. In cooperation with his MBA mentor, they tailored which doctoral program, Ph.D. or DBA, will better fit the researcher's s professional, academic background and aims.

Given the large researcher experience in financial services, his desire to further extend his knowledge and apply the knowledge gained to the financial services, pursuing a DBA program prevailed. And that's what the researcher did. By the end of 2016, he received approval from Sheffield Hallam University and commenced the DBA studies in early 2017. The researcher remains highly committed and motivated to contribute to the financial services sector and improve this vital domain whenever possible. In the next section, he will present his reflections once he completes the research and briefly describes how his professional experience grew and how it helped him carry this research, ultimately contributing to literature and practice.

2.4 Reflections

This section reflects on some of the critical moments of his academic life. He spent almost five years during his DBA full-time studies. It has been an arduous journey, intense and challenging when balancing personal and professional researcher's life. The researcher comes from a technical background. His primary degree is in Computer Engineering, whereas most of his professional career, once he was graduated, was developed in European financial services. Therefore, the financial services environment played a fundamental role in developing researcher values, norms, and perspectives. It also helped the researcher build the foundations of his future philosophical stance, which was largely detailed in Chapter 6: Methodology. Financial services are a very dynamic domain, in continuous change, but above all, they represent the face and the health of the country. A weak financial service means a weak economy. The exact correlation stands for firm financial services (Mersch, 2015). While technological advances have never been new to financial services, digital innovation has brought significant computing power and cost improvements with newly created and usable data (Feven et al., 2021).

To some extent, the researcher feels lucky since he has been part of the technological environment for the last 20 years, witnessing how technology and financial services have changed. Exposing him through the years to the vast array of challenges and difficulties from an early age helped and shaped the researcher to develop his life skills and responsibilities. He started his career as an ATM/ POS engineer and later progressed in senior managerial roles in Head Office. The promotion resulted from the researcher's good reputation in the technical environment and his skills to efficiently

manage and lead several stakeholders with customer problems. This time of researcher career, when he started the executive MBA while continuing working full time in financial services, he mastered the skill of critical thinking, analysis, soft system thinking, and holistic evaluation of any given situation or problematic situation, to be honest. As a result of his new mindset, the researcher realized the importance of maintaining and building steady relationships with as many as possible stakeholders could lead to improved results.

This approach turned to become beneficiary for the current study. The researcher managed to acquire all stakeholders involved in all projects under his evaluation. Using his soft system thinking approach, the researcher was able to identify key people, processes, structures, and issues that occurred during LSS applications in their organizations. It helped the researcher improve the data collected and reflect on the main aspects of the participants' day-to-day activities when using the LSS methodology. The researcher became aware of operational difficulties that participants faced but received precious feedback on overcoming these difficulties. As an experienced practitioner, the researcher had the chance to see the advantages and disadvantages of various processes in financial services. He was always a demanded person when it came to understand and learn the world around him.

The motivation to understand more about financial services and their core processes resulted from his immense experience in this domain. They are currently undergoing a radical shift, driven by new competition from FinTechs, changing business models, and disruptive technologies (Wingard, 2021). The researcher was always keen to learn about the environment he grew in. Irrespective that the research started over four and half years ago, it managed successfully to maintain its actuality and reflect the latest changes in financial services. He continued to keep the same passion developed in his past experiences. He applied the best principles learned in university in various assignments as a casual researcher or consultant during his DBA studies. The motivation to continue this journey was also influenced by the fact that sometimes the literature was not entirely a reflection of the practice. Bridging the practice and academia motivated the researcher to dig deeper and clarify some of the most common themes in LSS as a subject matter. Using system-thinking principles, the research provided a mechanism to evaluate the LSS critically and came out with valuable suggestions on having a successful LSS application. It went beyond the manufacturing cliché of LSS and paved the way for the new digital era that financial services are experiencing.

Both academia and financial services practitioners will find the research relevant for the detailed investigation in the subject and the methodology used by the researcher to carry out that investigation. In the next section, the researcher will summarize the critical moments of his DBA journey.

2.5 Key Moments in Researcher DBA's Journey

Given the curious nature of the researcher and his passion to contribute to financial services and justify his work with an academic background, pursuing a DBA program was considered a natural step for the researcher to explore his passion. The doctoral route helped him demonstrate his ability to conduct independent research, showcasing his knowledge in the subject matter under investigation. His doctoral journey was filled with several significant moments. Initially, the acceptance of his research proposal, which was followed by the official start of his studies in early 2017, was a defining moment for him.

He officially and seriously started to re-arrange his personal and professional life for the upcoming years. The first two years of DBA studies consisted of four taught modules helping the researcher build his academic foundations on reaching the doctoral level. All assignments associated with modules allowed him to structure his research, critically evaluate many authors, learn about philosophy and linked it to his study, and appropriately use the methodology in meeting his goals and address the research questions. The successful completion of his first two years of study has culminated with the DB2 presentation event. In this presentation, the researcher received very valuable feedback from examiners both in practical and academic terms. Following this critical milestone, the researcher started preparing to approach the participants to shape his research. Since his work was entirely based on collecting primary data via interviews, the researcher initially designed and submitted the ethical form to the research degree committee.

Their approval marked the beginning of his research in the field to acquire as many participants as possible. It took the researcher one year and a half to collect the primary data, where the pandemic of covid-19 had its toll in prolonging this process. It was a challenging process with some setbacks in its way, but when completed, it became one of the most defining moments of the researcher's doctoral journey. Relieved with a successful data collection process, the researcher happily started and completed writing

the thesis. He dedicated himself full time to the most crucial moment of his doctoral journey and is very grateful about his supervisor's feedback supporting him to cover all research areas. The participants played a significant role in completing the thesis, and in the next section, the researcher will explain the importance of their involvement in successfully conducting his research.

2.6 Importance of Practitioners

The extensive experience of the researcher in financial services, blended with his core technical background, provided an ideal match for him to carry out his research. Through the years, the professional network he built helped him get in touch with key stakeholders from various financial services domains. All participants acquired for the study were personally and directly involved in all LSS projects in their organizations. This advantage enabled him to capture the latest and best data from the people facing the issues in day-to-day activities.

The researcher was interested in producing a scholarly-based piece reflecting practitioners' reality with the latest up-to-date discussions from the academic perspective. Primary research managed to produce somewhere to 60 000 words of data that were used to perceive participants' experiences with LSS applications. The researcher employed the Soft System Methodology (Checkland, 2000) to structure and accommodate the feedback from all participants. Transforming stakeholders' understanding of the situation in rich pictures, CATWOE, and system activity models helped the researcher understand the philosophy of themes that emerged and validated the steps taken to improve the situation. Data collected were extensively used in the research, and probably they would still be used in the future by practitioners and scholars to investigate LSS applications further. They will also be used to show how leveraging SSM can structure messy and complex situations into detailed activity diagrams.

Ultimately the researcher acknowledges the importance of using the practitioners and personally witnessed their contribution to his research. Researchers often find it hard to get data from organizations; without the support and cooperation from practitioners, the researcher wouldn't be able to complete the research. All participants enjoyed the content and flow of the researcher's interviews. They honestly answered all questions, provided valuable suggestions, and were eager to see and learn how their day-to-day

concerns will be addressed in the literature. The research received attention from academia and practice. The researcher considers evaluating the LSS in financial services as the first step for future studies. He will continue to work on the subject matter and encouraging academia and practitioners to test, implement or investigate his future recommendations.

2.7 Researcher Learning Process

Earlier on, the researcher summarized the most defining moments in his DBA journey. This summary was followed by the importance of practitioners in supporting the researcher to address the literature concerns correctly. Despite obtaining an MBA degree five years ago, most of the subjects learned during doctoral programs were new for the researcher. Learning about philosophical stance was new. Every researcher brings certain beliefs and philosophical assumptions in their research.

Clarifying those stances such as the researcher's view of reality (Ontology), how he knows the reality (epistemology), the procedures he used in his research (methodology) were fundamental in providing the right direction of the research. They helped the researcher formulate the research questions and seek the correct information to answer those questions. He started the interview process in December 2019 and finished it in April 2021. There were 17 interviews in a very diversified financial services portfolio such as banks, financial services, and financial shared service centers distributed in diversified geographical locations. The researcher had previous experiences with interviews, mainly in its workplace when holding general admin roles. However, conducting interviews with practitioners now with academic backgrounds and understanding that process was entirely new and different for the researcher.

Regardless subject nature of his study, the researcher was objective with all participants and never used his experience to influence their answers. Alongside interview skills, the researcher also mastered his skills in using SSM as an interpretative methodology. He firmly believes that being equipped with a robust system thinking mindset will enable him to deal efficiently with complex or messy situations he could face in the future. Still, in the same way, he would be able to justify it academically. Overall, new skills that the researcher learned during his study that he materialized in the methodology, findings, and contribution chapters helped him learn about LSS applications and paved the way for future research regardless of the nature of the subject.

2.8 Chapter2: Summary

The introduction and the importance of practice chapters set the stage for the research and the researcher. He explained the study's background, motivation, and rationale, constituting the research aims and objectives. He also summarized his experience with the DBA studies highlighting some of the challenges in his doctoral journey and the passion that helped him overcome them and complete the program. The next chapter is the literature review, where the context and the main variables of the research will be critically reviewed, unearthing many discussions by some of the most relevant articles and authors.

Chapter 3. Literature Review

3.1 Introduction

The literature review is vital because it serves as the basis for knowledge management, creates guidelines, provides evidence of a particular effect, and builds the foundations for future research and theory (Snyder, 2019). This chapter aims to review the literature relevant to the research topic and identify the theoretical gaps to develop the research questions further. The academic background examined in the research is the application of quality improvement approaches in financial services. Among various quality improvement methodologies, the study will entirely focus on Lean Six Sigma, which stands as state of the art in project methodology (Salah et al., 2010) in improving the efficiency and effectiveness of processes (Da Silva et al., 2018).

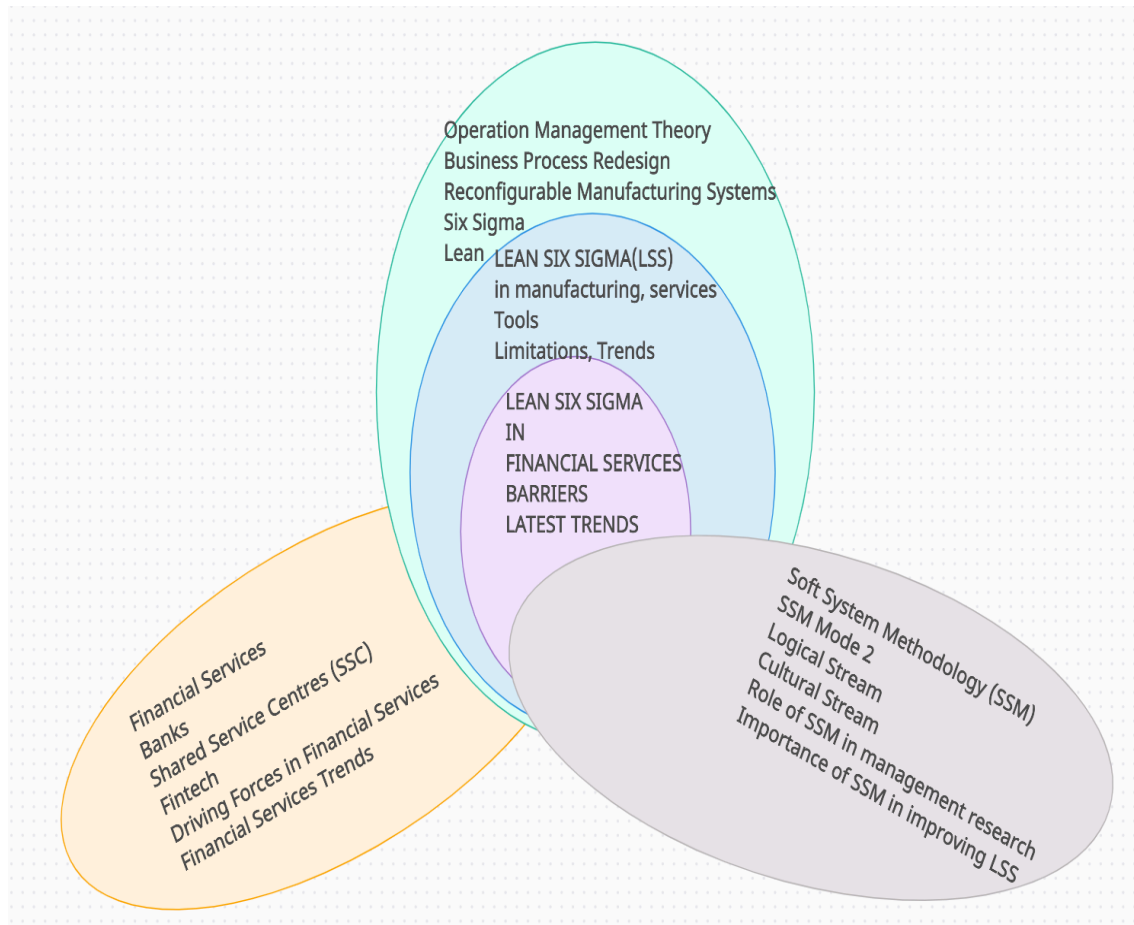
The whole point of the literature review is to survey scholarly sources on a specific topic. But what differentiates a good literature review from merely summarizing is critically evaluating the existing knowledge and allowing the reader to identify relevant theories and gaps in the research (McCombes, 2021). Hence, before starting the literature review, any researcher usually has a list of critical questions to find answers for and where to.

In this context, some of the questions that drove the strategy for the literature review in the current research were: What is the underpinning theory management LSS is deriving from? How does LSS in financial services stand in the industry context? What makes the research necessary? How did LSS develop through the years? What are the limitations? Trends? What are the gaps that triggered the investigation? To whom is it addressed? According to Kitchenham et al. (2002), the researcher will also need to identify and evaluate different factors that could affect the generality of the findings. They highlighted that there is an implication that industrial context contains many factors that affect generality.

Therefore, the researcher prepared a framework of the theoretical journey (Figure 1), which "set the stage" for presenting the context that caused the researcher to conduct the study (McGaghie et al., 2001). The goal is to gain knowledge and understanding from various angles on the subject matter. Through the lenses presented in the framework, the researcher will navigate the literature review in an industry context and then narrow down the problem statement on domain perspective in financial services. Literature reviews contribute significantly to different domains' conceptual, methodological, and thematic development (Hulland & Huston, 2020).

Figure 1

Theoretical Journey and Contextual Research Lenses adopted in the study.



(Islamaj, 2021)

Furthermore, the aim of overviewing a topic, a semi-systematic or narrative review, often looks at how research within a selected field has progressed over time or how a subject has developed across research traditions (Wong et al., 2013). This type of analysis can help detect theoretical perspectives or common issues within a specific research discipline or methodology (Ward et al., 2009). The gaps identified in the literature review will also help the researcher to articulate straightforward research questions and goals (Lee et al., 2013) show adequate preparation (Norman and Taking 2014) in selecting the appropriate research method across (Artino et al., 2015) the entire research journey.

The literature review will start with an exploration of financial services. As the financial service has gone through a tremendous change from local banking towards a more global presence and due to the technology advancement, customer's demands and needs have evolved at the same pace (All Answers Ltd, 2018). These changes significantly

increase competition, meet unfulfilled customer needs, and reduce inefficiencies in financial services (Mnoghithnei et al., 2019). A subject advance when prior studies are synthesized logically based on the findings of previous studies (Kumar et al, 2020). After reviewing the field (financial services) where the research is taking place, the researcher will shift the main focus to LSS as the methodology under investigation. As shown in the framework, it will start by revealing the theory where is LSS is part from, then review the context, which justifies the origin and existence of LSS as a methodology until reaching the destination of applications in financial services, which is the aim of the research.

The following chapter will briefly overview the financial services landscape, the driving forces shaping them, the latest trends in this sector, and the summary. Then it will continue with the LSS chapter that will critically review LSS literature since its inception up to the latest trends. The final chapter will briefly discuss system thinking with the core subject, Soft System methodology. Gaps identified through this journey, alongside a summary, will close the entire literature review process of the research.

3.2 Overview of financial services

More than three decades ago Lewis (1987) suggested that financial services are built to fill three basic customer needs:

- the need to make payments for goods and services.
- desire to accumulate wealth for later consumption by means of saving or by borrowing for house purchase
- the provision of financial security, by which means spending can be maintained in the face of adverse changes in economic circumstances

The production of financial services that fill those needs includes underwriting of financial contracts, intermediation, risk management, payments processing, and other back-office operations (Berger, 2000). According to Asmundson (2010), the primary function is intermediating between savers and borrowers. It tries to match the people who want to take risks with those who don't. Lending and collecting payments are complicated and risky, that's why an intermediary is needed as the best route for the savers. Financial service companies perform a range of activities to support the economies (Hatzakis et al., 2010). They categorize financial services as follows: "primarily firms in retail banking, commercial lending, insurance (other than health), credit cards, mortgage banking, investment advisory, and asset management (mutual funds, hedge funds, etc.)."

This is confirmed by Alt and Puchmann (2016) who agree with this categorization and confirm that the financial sector has changed a lot since the first Bank was established in 1472. Today, these services have become an essential part of our lives and have received a large audience in academic literature (Phan et al., 2019). International Monetary Fund (IMF, 2020) has elaborated further the financial services and defined them as a process by which customers and businesses acquire goods...not as economic goods itself, but as an acquiring process for goods...e.g., mortgage application. For instance, in 2016, the financial services in the US accounted for 7.3% of GDP (SelectUsa, 2017), 8.4% in 2011 (Lahart, 2011), and peaked at 22.3% in 2020, according to Statista Research Department report published on June 3rd of 2021. While in the European economies, financial services and insurance accounted for approximately 5.1 percent of total GDP in 2016, with about 2.6 million people employed in financial services (Eurostat, 2017) and almost 11% in 2020 (Statista, 2021).

Financial services can help drive development by facilitating investments in their health, education, and businesses. According to Demirgüç-Kunt et al. (2020), several kinds of research reveal significant benefits from financial inclusion due to digitalization. Some other authors argue that despite the growing audience, there is still a considerable lack of research on how financial service operators extend their services to the unbanked, the financially vulnerable, and excluded customers (Asuming et al., 2019; Mogaji et al., 2021; Wayne et al., 2020). In the bottom line, the financial services sector provides financial services to people and corporations. This segment of the economy is made up of a variety of financial firms, including Banks, lenders, etc. (Investopedia, 2021) or optimized financial management models like Shared Service Center (Chen, 2018), and lately, Fintech relatively new subject in literature but commonly known as the most innovative in the financial industry (Iman, 2020).

The following sections will provide more information about banks, shared service centers, and Fintech as the most distinguished financial service models.

3.2.1 Banks

"The bank is dead. Long live the financial supermarkets" (Hamilton, 1986, p. 99)

Banks are probably the earliest version of the financial services, with the first references found in Genoese (Italy) notarial record of thirteen century in the organization of Mediterranean trade and shipping in the time of crusades (De Roover, 1954). The main products of banks are loan and deposit products on the market, provisioning the

necessary liquidity for their borrowers and depositors (Freixas & Rochet, 2008; Heffernan, 2005; Roman and Sargu, 2014).

According to Vives (2016), Banks perform several essential functions in the economy. The core one consists of taking deposits short term and making loans long term. Since the 2008 crisis, many banks have struggled to profit, forcing them to innovate to minimize costs. Competition has motivated banks to embrace digital channels to automate delivery services (Alalwan, Dwivedi, Rana & Simintiras, 2016; Koenig-Lewis et al., 2010; Palmer & Moll, 2010). This interest has been boosted by a growing body of evidence showing that digital channels can improve the economic welfare of individuals (Dupas & Robinson, 2013a, 2013b; World Bank, 2014). Credit products can help finance personal and families cope with economic shocks and invest in their health and safety (World Bank, 2014). Mazzucato and Penna (2016) have collected evidence for development banks' importance in boosting innovation and furthering socio econo and environmental progress.

Usage of physical branches is continually falling and, the digital banking uptake is continually rising (BBC, 2016). According to Mbama (2018) digital banking means that financial management models are changing and customer acquisition and retention, as well, while and financial performance are no longer determined solely in the branches (Mbama, 2018). It involves performing simultaneously three sets of activities: transmuting the characteristics of financial assets and liabilities, providing payment services, collecting, and processing information (Navarette et al., 2018). Different authors (Hong et al., 2016; YuShen & Ibrahim, 2019) explored the service innovation strategies through environmentally and socially practice. They are proposing the strategic planning of banking institutions by optimizing their resource allocation to ensure sustainable growth. Mogaji and Danbury (2017) suggest that banks need to develop and adopt innovative traditional marketing methods to reach unbanked customers because they are less likely to engage with digital media.

Traveling to get to a financial service point creates a barrier for financial inclusion, Bermeo (2019) argues. Therefore, banks need to improve the understanding about their customers through appropriate consumer engagement with technologies such as smartphones (Dwivedi et al., 2019) for developing a product that appeals. The exponential growth of smartphones and the significant amount of data generated from their usage brings an incredible opportunity for banks to learn more about their customer behaviors (Cunneen et al., 2019).

A push to offer more sophisticated financial services could open the door to a stake sale to highlight the business's value (Fildes & Willson, 2019). Vives (2019) argues that the reason for this shift is that banks have had to deal with all the threats arising after the crisis and digital disruption stemming from financial technology (FinTech) and platform-based competitors. He insists that profitability for European and Japanese banks barely covers their cost of capital. Becoming familiar with the Bank's products will improve the customers' relationships with the banks and give them a chance to enjoy the benefits of technology (Abdulquadri et al., 2021), though on a small scale. To survive, the incumbent banks must react and adapt new strategies (Navaretti et al., 2018).

Regarding the findings on "Complex technology and increased regulation", Diener and Spacek (2021) strongly suggest that banks are in immediate need to implement digitalization competitively and sustainably. They noted that the only thing that needs to be done is acquiring the appropriate people to deal with these issues. These words resonate now more than ever and imply a full change of the Bank's business model and strategies.

3.2.2 Shared Service Centre

To stay competitive, forward-thinking organizations attain competitive advantage by making their organizations more flexible (Gottfredson et al., 20005) and by centralizing core and support activities (Sako, 2010). Schulz and Brenner (2010) defined the adoption of these centralizations as partly autonomous business units for a financial account, logistics, and human resources called Shared Service Centers (SSC). Zhang et al. (2008) suggest that critical factors in constructing the financial sharing center model are the standardization of the financial system, financial personnel, and financial management (Zhang et al., 2008). Duan (2009) and Zhou (2010) suggested that financial knowledge and staff training are crucial for SSC standardization and effectiveness.

Despite many success stories of SSC implementations, SSC failed to achieve goals (Schulz et al., 2010). Therefore, scholars suggested that the introduction of SSCs should include complex combinations such as internal configuration and make or buy decisions (Farndale et al., 2009; Gospel & Sako, 2010). In general, due to the uneven development of business habits in different SSCs, standardizing operating procedures is not always ideal. Huang Qinghua and Du Zhou (2014) suggested that to have a

successful standardization; four factors should be rigorously followed: effective management innovation and the transformation of the mode of thinking, standardized information platform unified, standardized financial system and operating procedures, internal control, and the construction of financial early warning system.

More than 75% of Fortune 500 companies have established shared services models to achieve cost savings and performance improvements (Richter & Brühl 2017). The Financial Shared Service Center (FSSC) has been recognized and utilized by more enterprises and corporations as an innovative and optimized financial management model. According to Chen (2018), it can improve the efficiency of monitoring and reporting by aggregating accounting business from different regions or locations to the same center. Financial SSC is a sort of innovation in the financial management model by integrating all the financial business units to reduce costs and improve efficiency. Zhao (2020) advocates that the application of SSCs strengthens group management and control, standardizing accounting, and preventing financial risks. It is also suggested that constructing SSC location, process design and support should be taken in consideration. It promotes financial accounting centralization and accounting sharing information. Liu (2021) recommends that a reasonable application of the financial shared service center can solve the problem of repeated investment in financial management, reduce the enterprise's economic operation cost, and promote the increase of its economic output value.

Despite persisting problems in operation models in SSCs with the vigorous development of information technology in the era background of big data, the financial shared service model can effectively integrate with the internal functions of the enterprise (Ma et al., 2021). The financial shared service model has come with new challenges compared to the previous financial systems, which usually make transformations according to the needs of an enterprise to better complete and promote financial work (Gao, 2021).

3.2.3 Fintechs

“The aim is to inflict death by a thousand cuts. Fintech start-ups are nimble piranhas, each focusing on a small part of a bank’s business model to attack” (Financial Times, 14 October 2015).

Financial technology (FinTech) is probably the most used term in the entire financial sector in the last decade. This term has become a buzzword among private and

institutional investors and is one of the fastest-growing areas of technology with investment amounted from 2 billion US dollars in 2010, exceeded 7.5 billion in US dollars in 2015 (Accenture 2015), and 1.5 billion US dollars in Europe (KPMG, 2016). According to PwC (2016), around 83% of financial services consider that different parts of their businesses are becoming riskier due to FinTech expansion.

There are growing concerns among banks about technology companies' competition, and it is highly likely they must get what Bunea et al. (2016) analyzed. The media has bombarded the `Fintech image as revolutionary armed with digital weapons to overcome all existing financial institutions' barriers (World Economic Forum, 2017). Chen (2016) revealed that non-financial institutions like Apple Pay, OnDeck, Kabbage are providing innovative financial services. Shim and Shin (2016) concluded that internet-based companies like Alibaba and Baidu gained much recognition in China and quickly became unicorn companies.

Despite revolutionary advancements, FinTech posed regulatory risk since, in the beginning, Avgouleas (2015) reckoned. In Germany, De Roure et al. (2016) found that Fintech companies are crediting those consumers neglected by German banks. It will challenge the established business model and service offered by technology innovation (Gomber et al., 2017). Earlier on, Thakor (2012) argued that financial innovation where FinTech belongs is shown to be risky, which later on was denied by Puschmann (2017), who claimed that Fintech is "[...] incremental or disruptive innovations in or in the context of the financial services industry induced by IT developments resulting in new intra- or inter-organizational business models, products and services, organizations, processes and systems". The Financial Stability Board (2017b) defines FINancial TECHnology as "technologically enabled financial innovations that could result in new business models, applications, processes, or products with an associated material effect on financial markets and institutions and on the provision of financial services."

Despite the differences, Varga (2017) noted that that Fintech refers to companies that develop financial services and products by relying on much more intense use of information technology. The underlying portmanteau of FinTech is that it combines "finance" and "technology" (Gomber et al., 2018) and involves the integration of financial services with emerging technologies such as cloud computing, big data, and artificial intelligence. Various scholars (Barberis, 2014; Lee and Shin, 2018; Leong et al., 2017) concluded that this combination provided more innovative services like Peer-to-Peer (P2P) lending, mobile payments, or crowdfunding. In the USA, where Fintech crediting is complementing Bank's lending for SMEs, Tang (2019) suggested. In

Argentina, 35% of small borrowers from an eCommerce platform weren't eligible for bank loans (Frost et al., 2019). Frost (2020) thinks that credit from tech monies or Fintech is prevailing with low-density Bank's areas and populations irrespective of geographic distribution. Meanwhile, regulation is becoming challenging because it should be incrementally adopted or radically reform the financial service regime with ad hoc exemptions dubbed as regulatory sandboxes (EBA, 2017). Therefore Anagnastopoulos (2018) is slightly cautious in unfavorable regulation since it is a new thing, and regulations vary from country to country.

Frost (2020) argues that regulations will not affect the fintech adoption rate at an aggregate level at least. The latest supporting evidence shows that FinTech has yielded substantial value to investors (Chen et al., 2019). When it comes to credit risk, Cheng and Qu (2020) found out that the introduction of FinTech has significantly reduced the risk compared to banks. It has also mitigated the risk anxiety factors such as Know Your Customers (KYC) policies (Shao et al., 2020), while significantly increasing the financial inclusion of unbanked customers (Huang et al., 2020). On the other hand, too many market participants providing similar services may distort the market and make supervision more difficult. Broadly speaking, many economists have started to question whether financial innovation will promote healthy competition where some banks will stay in and others don't, or it could create more chaos out of the market (Pu et al., 2021). That's why it is essential to discuss some of the fundamental driving forces currently shaping financial services.

3.3 Driving Forces In Financial Services

Financial innovation, particularly the innovation related to the application of information and communication technologies, has revolutionized financial services, and probably will continue to do so in the future (Dabrowski, 2017). They refer to innovators and disruptors that offer more security, flexibility, and efficiency (Gomber et al., 2017), leading financial services in some fruitful avenues (Wonglimpiyarat, 2017).

The fintech adoption index showed that nearly one-third of the consumers in the 20 markets surveyed use at least two fintech services, and 84 percent of those surveyed were aware of fintech services (Lloyed et al., 2017). The world has already recognized the potential of financial innovation (KPMG, 2018). Five years ago, the fintech industry attracted \$12.2 billion in investment (Accenture, 2016); in 2018, the top 250 fintech firms collectively raised more than \$31.85 billion (CBInsights 2018). Gobble (2018) concludes fintech philosophy of digitalization is increasingly embedded in our everyday

economic life. Sinha (2021) summarized the technological revolution is bridging the gap between the flow and real-time cash access and has significantly improved user interfaces with Bank's applications. Some of the main aspects of this technological revolution, such as technology innovation, process disruption, and services transformation, deserve additional discussions in financial services.

3.3.1 Innovation

Adomavicius (2008) describes technology innovation in three basic terms: components, products and services, and infrastructures. Together they can be used to characterize the manner they can be connected and create the technology capabilities. For many years financial services invested a lot in technology to innovate their system and improve efficiency. This domain has witnessed the development of various innovations like electronic fund transfer at the point-of-sale (EFTPOS), automated teller machine (ATM cash dispenser), internet banking (Wonglimpiyarat, 2017) optical readers using RFID for automatically scanning and processing documents (Spiridonov, 2018).

Scott, Van Reenen and Zachariadis (2017) have examined the impact of innovation, particularly the adoption of SWIFT in 6848 banks in USA and Europe and concluded that it has large effects on profitability and exhibits significant positive effects in performance. In the last years, many organizations successfully such as Google, Uber, and Amazon successfully adapted digital technologies and dominated their markets, whereas other companies such as Kodak failed to do so and became obsolete. Embracing digital technologies and transitioning to a fully digital enterprise requires a proper mixture of technology capabilities, business model realignment crafted with solid leadership skills (Karagiannaki et al., 2017).

Products and services are created for consumers to buy and use (Gomber et al., 2018) suggested. They insist that the usage and diffusion can often be dramatically improved via digital infrastructures that bring closer the wider public...e.g., Google Play. Mention (2019) finishes his book by stating that the main issues in this technological revolution "is not data or technology." It is about people, culture, and processes. The author challenges the executives leading the change to "stop asking what you think but instead ask what you know.

3.3.2 Process Disruption

In a report prepared by PWC (2016) summarized the key disruptors that will shape financial services in 2020. They are:

- a-) The fintech approach could become new model and the mainstream of products and services will become fully digitalized.
- b-) Blockchain will go beyond crypto and achieve critical adoption in financial services.
- c-) Customer intelligence is going to become focal point in company's profitability

Vasiljeva and Lukanova (2016) strongly suggested that financial services in innovative solutions such as services automation, new payment infrastructure, and big data analysis. According to Carstens (2018), it is ought to the customer changing expectations that make digital transformation indispensable. Digital banking enables banks and their customers to have mutual benefit from financial services. However, Mbama (2018) advises being cautious since customer-changing expectations would be challenging for financial services to help. Digital transformation is receiving considerable attention in all business, human and technological areas. As the result of changes in traditional business, ecosystems have created a new environment called the "digital business ecosystem," Turkmen and Soyer (2020) specify.

On the other hand, this digital transformation and the adoption of new technologies raise a growing number of questions about the changes that traditional companies, strategies, and management practices need to implement to respond to them (Hess et al., 2020).

When new digital technologies change the customer experience, processes, and business models, digital disruption occurs, and actors in an ecosystem create value changes (Bolton et al., 2019). These tactical or strategic changes in business models enable companies to create entirely new ways to be value-added (Haffke et al., 2016).

The concept of digital disruption is often referred to as the "environmental perturbation caused by digital technology," which leads to the erosion of the boundaries and approaches that have been used as a basis for organizing production and fixing value (Skog et al., 2018). Stepping into the digital world give banks great opportunities to introduce innovative models and valuable offers (Naimi et al., 2021), as result of the combination of their existing services with new digital capabilities. While constructing new playing fields, technology is posing some challenges for the existing businesses. Bhandari (2021) thinks that the new technology opens new opportunities for banking and financial services and reducing the existing ones and creating windows of

challenges. In an interview, Hinterhuber and Nilles (2021) advise financial services to focus on opportunities rather than challenges. They advise to focus more on opportunities rather than challenges and invites all the players to see the digital transformation as the Holy Grail: *a force that is not easy to find, not easy to capture and that has the potential to dramatically improve the customer experience*".

3.3.3 Digital Transformation

Emerging technologies challenge existing business practices and alter firms— creating new customer relationships and business models (Fitzgerald et al., 2014; Picinini et al., 2015; Setia et al., 2013). A digital transformation is a holistic approach involving technologies and organizational changes (Matt et al., 2015). It helps the organization go from a very outdated working concept to a brand-new way of thinking (Majchrzak et al., 2016; Terrar, 2015). Valdez-de-Leon (2016) argued that the advancement in technology primarily drives digital transformation. Fernandez (2017) identified that one of the problems with banks in applying digitalization is incomplete implementation, thus providing a limited number of services. As a response to that, many new innovative players with new concepts and a modern multichannel approach in terms of communication have emerged (Dorfleitner et al., 2017).

Meanwhile, digital transformation needs to settle with the generativist approach of emerging digital technologies (Legner et al., 2017) to re-conceptualize business models and processes. Prior studies have observed that re-conceptualized structure changes failed as Business Process Management (BPM) logics didn't consider the dynamics of change (Besson and Rowe, 2012; Muller et al., 2017; Wessel et al., 2020). To address these challenges, organizations need to start a holistic socio-techno approach for the transformation process (Legner et al., 2017). According to Singh and Hess (2017), this requires implementing a comprehensive digital strategy, which accounts for the opportunities and risks from digital technologies, which will facilitate the improvements in the business process by continuously integrating innovation.

With infrastructure changing due to digitalization, processes became more complex, sometimes delaying companies from delivering the market's services. Given the scale of the infrastructure, some management teams prefer to use the agile approach rather than conventional methodologies to solve the problems (Comella-Dorda et al., 2018). The scaling up agile methodologies in financial services will lead to greater efficiency and productivity. It will improve operating architectures, and changes will come online faster. Finally, the business delivers better financial results and greater customer loyalty

and employee engagement (Rigby et al., 2018). In the current era of digital servitization, many scholars (Cooper & Sommer, 2018, Parida et al., 2019) suggest replacing traditional innovation processes with agile, creative approaches.

The rapid increase of digital technologies in financial services seeks radical changes in business models, services, and products (Sjödén & Parida, 2020; Skylar et al., 2019). More research about the impact of digital transformation could lead to the enrichment of the investigation of digital transformation and the banking sector in general (Diener & Špaček, 2021). Butt and Butt (2021) concluded that the digital trends (some of them will be shown in the next section) in the banking industry have seen banks focusing on digitalization core processes, increasing awareness, financial inclusions, and undertaking sustainable development practices.

3.4 Trends in Financial Services

“This magical combination of geeks in T-shirts and venture capital that has disrupted other industries has put financial services in its sights. From payments to wealth management, from peer-to-peer lending to crowd funding, a new generation of startups is taking aim at the heart of the industry” (Mackenzie, 2015).

Financial products have been the exclusive domains of traditionally licensed credit institutions' payment services and loans, among others, are now offered by fintech firms (EBA 2017). These firms could be smaller, but more agile supporting a greater diversity of products and services (Davies et al., 2016). They feature different cultures with traditional firms (Gomber et al., 2017) and other operational bases, with a reduced human touch on the purely transactional aspects and supported by machine intelligence where that is appropriate (Gomber et al., 2018). Khraisha and Arthur (2018) defined financial innovation as "a process carried out by any institution that involves the creation, promotion, and adoption of new products, platforms, and procedures or an enabler of technologies that introduce new ways a financial activity is carried out."

Meanwhile, Srinivasanabd, and Rajarajeswari (2021) listed the most critical areas where financial technology is contributing, such as credit, deposits, and capital-raising services; (ii) payments, clearing, and settlement services, including digital currencies; (iii) investment management services, etc. The researcher will focus on the core aspect of financial services experiencing significant improvements like branchless banking, real-time credit monitoring, credit scoring, procure to pay, and approval and payments.

3.4.1 Branchless Banking

“Banking is necessary, but banks are not”.

Bill Gates, 1994.

Branchless banking (Balasubramanian, et al., 2003) means reaching financial services without physically visiting the Bank. According to the CGAP (2008) report, branchless banking has significantly contributed to financial inclusion in developing countries. Most financial service providers cooperate with different businesses with local presence to use their services. McKay and Pickens (2010) evaluated branchless banking service providers in ten countries and concluded that the solution could quickly serve the underprivileged customers with lower costs for the Bank either. Campbell and Frei (2010) have reported that the adoption of online banking can result in substitution by alternative service channels and increased the likelihood of long-term customer retention. Technically speaking, this kind of service involves delivering financial services outside conventional bank branches, using third-party intermediaries such as card-reading point-of-sale (POS) terminals and mobile phones to transmit transaction details (CGAP, 2011). Faure (2013) thinks that banks should be at the forefront of innovative developments to face the competition successfully.

However, Barakat and Hussainey (2013) identified possible failures resulted from faulted and poor internal processes, employment as part of operational risk an excellent barrier for Fintech. Mori and Zimmer (2015) highlighted that there is a need for branchless banking solutions at small shops scattered in remote areas; operational risk problems Rushandie (2015) can very well be mitigated using the same technology in stand-alone banks. Suri (2017) argues that the success of financial service solutions using agents will depend on the agents' level of trust, efficiency, liquidity, and profitability. This transition has also opened the market for nonbank firms to offer financial services. Millennials are particularly susceptible to new entrants as 84 percent now consider obtaining their banking services from a major tech company such as Google or Apple (KPMG, 2017).

On the other hand, Liu et al. (2017) have shown that consumer use of mobile apps has led to increased demand for other digital services. Aron (2018) outlined that this approach has proven successful in providing financial access to the unbanked population. There were no needs for physical branch offices as it was used to have before. They collaborate with retail stores to fulfill customers' needs for financial products. In several countries (Afrika) financial services using agents are provided mainly by telco operators with mobile money coverage with 60% of the adult

population, while in Asia is 20% and mostly provided by banks and Fintech (Pasti, 2019). Alongside with financial factors Palaon et al. (2020) noted that non-financial factors were also found influencing on business owners' satisfaction, which is one of the reasons for them to become bank agents as well. It can be concluded that Branchless Banking is influential and dramatically reduces cost (Susilo et al., 2020), and greatly assists the Bank in obtaining a potential increase in third-party funds throughout the region.

3.4.2 Credit Scoring and Approval

The main impact of technological innovation in financial services is making them more accessible for customers. Research from Wang et al. (2013) concluded that several online credit scoring and validation tools emerged, such as Credit Karma, Lenddo, and Klarna, diversifying the credit market. World Bank Group (2017) influence on peer lending is an online platform that offers mainly a new alternative.

Sindeo (2017) (www.sindeo.com) improved the lending lifecycle. Wang and Overby (2017) complain that personal bankruptcy has increased despite the credit boom, and more research is needed to understand the long-term consequences of easy access. To mitigate this problem, Fintech firms have started to use scoring models in two ways. The first is that technology allows financial intermediaries to collect and access larger quantity of information Berg et al. (2018); secondly, they use machine-learning techniques (Gambacorta et al., 2019).

In the loan level, Fuster et al. (2018) show that Fintech lenders process mortgage applications about 20% faster than other lenders and adjust their supply more elastically than other lenders in response to excessive mortgage demands. Jagtiani and Lemieux (2018a) analyzed loans made by a large fintech lender, and similar loans originated through traditional banking channels. The scoring model resulted in an 80% decline in rating for 2007 loans. In the USA, online lenders accounted for about 8–12% of new mortgage loan originations in 2017 (Buchak et al. 2017; Fuster et al. 2018), while in China, Fintech crediting is around 3% of total outstanding credit to the nonbank sector at the end of 2017 (BIS (2019)). Vallee and Zeng (2019) studied the difference of P2P lending between conventional banking and FinTech, P2P lending, noting that credit decisions made in FinTech use different information for scoring decision engines. Especially for millennial that are less likely to use credit channels becomes essential. Tang (2019) investigated P2P lending will exist in both formats for the banks to complement or substitute.

According to Bazarbash (2019), 'the technological advances have enabled new business models to make credit decisions more efficiently and offer loans at a higher speed and lower cost. These types of loans are strictly transactional, typically short-term credit lines that can be automatically cut if a customer's condition deteriorates (Gambacorta et al., 2019). Fuster et al. (2019) provided evidence that Fintech has significantly improved the productivity of mortgage lending. Credit ratings are important indices for banks to assess the risk, particularly when the financial markets are not stable. Empirical results demonstrate that the new classification models are more accurate and outperform traditional techniques (Huang et al., 2021). Businesses are setting up to simplify the data collection and verification processes beyond the mortgage concept. They are building platforms that can verify income based on historical deposits and streamline Automated Clearing House (ACH) authentication to have real-time payments.

3.4.3 Faster Payments

According to Norman (2010), payment systems can be classified as large-value payment systems (LVPS) and are widely adopted by monetary authorities such as the European Central Bank. Meanwhile, faster payments (also referred as "faster settlement") typically mean that funds are transferred from one financial institution to another, such that the payee benefits from the receipt of irrevocable funds that could be immediately deployed for any purpose (FIS, 2015). Bank for International Settlement (BIS, 2015) argues that one of the technological revolution targets is instant payments and settlements domestically. Their definition of "faster payments" is that they involve "domestic, inter-bank . . . purely electronic payment systems in which irrevocable funds are transferred from one bank account to another and where confirmation back to the originator and receiver of the payment is available in one minute or less". Meanwhile Avergun and Kukowski (2016) suggests that an efficient payment process means offering superior solutions for payment processing with lower costs either.

Guo and Huang (2017) claimed that the whole financial services industry is looking for new ways to speed up and streamline payments processing. Failure to do so might have consequences later they insisted. Saunders (2019) revealed that services like Venmo and Square Cash can enable people to make person to person and person to business real time payments and Federal Reserve Board is considering having its own real time payment system. Dharmadasa (2021) recommends that growing smartphone usage will replace physical wallets to digital wallets (if not already did), and it will bring potential

disruptions to banks in the future. Financial services are not only changing the way they deliver the services and products, but also at the same time as broadening their menu of products Omarova (2021). For some these technological advancements came as a blessing especially in the face of the worst situation like Covid -19 pandemic that the whole world experienced

3.5 Chapter 3: Summary

The very reason underlying the existence of the financial services is filling the need to make payments for goods and services. Since lending and payments are risky operations, a regulated intermediary entity where the savers can trust their money, while borrowers can borrow the saver's money, then the financial services are the best mechanism for managing this relationship so far. They come in different models where banking is the oldest version and still amongst the best versions of the traditional financial services. However financial products like payment services and loans can't always be the exclusive domains of traditionally licensed credit union.

Forward-thinking organizations, to maintain their competitive stance in the market, have centralized their financial, human resources and logistic activities in what are called shared service centers. They are built to provide all financial services for their multinational companies across the world and serving local market either. While the technology is progressing and significantly advancing with smartphones, cloud and big data analytics, we are witnessing their greater adoption in financial services. In the last decade, especially after 2018 and now after the pandemic (which is not over yet) the adoption of FINancial Technology (Fintech) is probably the most used word in financial services. The innovation, disruption and digital transformation coming along with them are setting the pace for the future of financial services. Some challenges in the regulatory areas still persist, but they cannot outweigh the benefits brought in the financial services.

Being physically visible with a physical branch is not a must for providing financial services, and neglected customers from traditional banks have now more than ever multiple choices and apps to get served. Lending is the fundamental reason why the banks exist, and the latest technological improvements in credit scoring have reduced loan's lifecycle from months to nr of days to nr of minutes. Cross border payments no matter the geographical distance is becoming instantly executed. Failure to provide faster payments services could make banks vulnerable in industry competition.

Landscape in financial service is rapidly changing with these smaller, but more agile companies supporting a greater diversity of products and services. With infrastructure changing due to digitalization, front access for customer could become easier, while the processes in the back could become more complex.

Given the scale of changes in financial services, some organizations are quickly embracing agile methodologies, the others are updating and relying on conventional business improvement methodologies or use them both for solving their problems. In this very dynamic financial service environment, the researcher will investigate the conventional continuity improvement method of Lean Six Sigma known as the state of art in business process improvement methodology domain (Singh and Singh 2012). Therefore, the next chapter of the literature review will focus entirely on Lean Six Sigma: Discussions about Lean, Six Sigma, Lean Six Sigma altogether, their stance as process improvement methods, DMAIC framework, most usable tools, some feedback from manufacturing industry, latest trends and finally the applications in financial services will be critically reviewed.

Chapter 4 - Lean Six Sigma (Literature Review)

4.1 Introduction

Operations management (OM) theory is the set of practices that different companies use to increase production efficiency and is concerned with controlling the production process and business operations in the most efficient manner possible (Mcclay, 2019). He noted that modern OM consists of four theories: Business Process Redesign, Reconfigurable Manufacturing Systems, Six Sigma, and Lean manufacturing. "Lean manufacturing" is an OM concept originated by Toyota in the 1990s (Figure 1). The main idea was to maximize value creation while minimizing waste through continuous improvement (Womack & Jones, 2005). Six Sigma is a well-known OM practice as well. It was developed at Motorola in 1987 to realize the ideals of product quality by focusing on reducing process defects to 3.4 per million opportunities through a rigorous statistical approach (Higgins, 2005). In its purest form, Six Sigma is a process improvement model designed to address four key initiatives: Quality, Productivity, Cost, and Profitability (Bandyopadhyay & Lichtman 2007). Meanwhile, Holweg (2007) suggested that Lean manufacturing provides an enterprise perspective on the product development process, the customer management process, and the policy focusing process.

A few specific trained and certified individuals within a company are allowed to implement Six Sigma. In contrast, Lean empowers everyone to identify and eliminate non-value-adding activities (Pepper & Spedding, 2010).

“From this reduction in complexity, Lean identifies opportunities for improvement that can then be leveraged through the application of high powered, more focused, Six Sigma techniques, driving the improvement of the system further towards a Lean environment” (Pepper & Spedding, 2010).

However, individually, Lean manufacturing and Six Sigma cannot meet desirable improvement rates that the combined version of LSS achieves Antony (2011) argues. As a result, some companies have been using both models in parallel for years. Others focus only on Lean Six Sigma as the best combination for continuous improvement (CI) and operations management. Part of CI are many approaches like total quality management (TQM), BPR, JIT, Six Sigma, Lean, etc. (Albliwi et al., 2017; Furterer, 2016; Hammer, 2015; Monden, 2011; Oakland, 2014; Pepper & Spedding, 2010, Sreedharan & Sunder, 2018).

Lean Production and Six Sigma are the most popular strategies by companies seeking continuous improvement (Albliwi et al., 2014; Bakar et al., 2015). In fact, CI paved the way towards the consolidation of the LSS combination (Sreedharan & Sunder, 2018). The number of organizations that adopted Lean Six Sigma and successfully achieved improvements has significantly increased in the last 20 years (Antony et al., 2017; Sahoo & Yadav, 2018). USA and India have the most significant number of LSS publications and implementations, and Europe is surprisingly scoring low. For instance, in Europe, the first concepts of LSS in financial services were uncovered by mid of this century (Ndaita, 2015). While financial services are experiencing radical digital transformations, more gaps of LSS in the financial services context are surfacing. They are related to barriers, benefits, and rationale of implementing the LSS (Laureani & Antony, 2011; Sreedharan et al., 2018; Sreedharan et al., 2020). More information about Lean, Six Sigma, Lean Six Sigma, its applications and challenges in manufacturing, services, and financial services will be introduced in the following sections.

4.2 Lean

Womack and Jones (1996b) describe for the first time Lean as a philosophy whose principles and tools differentiate between "waste" and "value" in organizations. Waste refers to activities that absorb resources without creating additional value. Meanwhile, value is understood as something priced and timed appropriately capability provided to the customer.

But when precisely this concept emerged? As the result of World War Two constraints in mass production and after reviewing Henry ford's production line Eijj Toyoda and Ohno decided to develop an independent approach for Japan only (Ohno, 1998). They came along with a new system called Toyota Production System (TPS), whose primary goal minimize the non-value wastes while increasing production at the same time. With non-value waste, he implied the overproduction, waiting time, transportation, processing itself, inventories, etc. However, it was Krafcik (1988) that coined for the very first time the term "lean" in his article "Triumph of the lean production system" to attain high quality and production with half of the cost compared to other car manufacturers. While James P. Womack, Daniel T. Jones, and Daniel Roos, professors and project leaders of International Motor Vehicle Program (MVP) at Massachusetts Institute of Technology (MIT) used the term Lean Production to describe the Toyota Production System (TPS) in their 1990's book "The Machine That Change World"

(Womack et al., 1990). For several decades, LM has been applied by production organizations and is now a standard production model in modern manufacturing. Having roots in the Toyota Production System, Lean has been used in many production organizations and has set its own high bar in modern manufacturing (Spear and Bowen, 1999).

According to Ronald (2001), Lean is a philosophy of the manufacturing industry that incorporates a collection of principles, tools, and techniques into the business processes. They were used to optimize time, human resources, assets, and productivity, while improving the quality level of products and services they deliver. Although many companies implemented the lean concept, only 10 percent or less of the companies succeeded in implementing lean manufacturing practices Bhasin and Burcher (2006) pointed out. They mentioned that even though there are several lean tools and techniques, few companies are using them.

Empirical research is, however, scarce in this regard. One reason for this is the lack of conceptual framework clarifications (Pilkington & Fitzgerald, 2006), which marks the main disadvantage surrounding lean services confusion (Shah & Ward, 2007) and a source interpretation for the term "lean" (Papadopoulos et al., 2011). Mohanty et al. (2007) noticed that many companies that reported initial gains were locally and unable to have them continuously. Some authors (Voehl et al., 2010; Sacks et al., 2010) suggest organizations that seek Lean Production (LP) implementation should have the following characteristics: focus on business, development of managers, support for employees, customer orientation, and improvement opportunities analysis. Its mindset should be adopted from all employees if they want the success of the project.

On the other hand, process mapping in Lean is suggested in helping to identify various types of waste such as waiting time between activities and capturing tacit knowledge (Arlbjørn et al., 2011; Teehan & Tucker, 2010). Taj and Morosa (2011) affirm that LP is a multidimensional approach based on the following practices: JIT, total preventive maintenance, total quality, and human resources management. According to Maleyeff et al. (2012), Lean Production has its roots in the Toyota Production System and aims to reduce waste through extensive employee involvement and a collaborative relationship with suppliers and customers in problem-solving activities. LP comprises in two main pillars Aziz and Hafiz (2013) suggested: JIT flow, which consists of producing according to demand; and

Jidoka, which consists of man-machine separation in which an operator manages multiple machines.

One of the major reasons for unsuccessful implementing of lean manufacturing is the typical behaviors exhibited by people in the workplace, which are known to be deficient trust and gain commitment (Čiarnienė & Vienažindienė, 2012). Nicoletti (2013) on the other hand, demonstrated how the application of Lean could be expanded to the IT field describing the benefits to procurement for instance. Meanwhile Bhamu and Sangwan (2014) complained about lack of evidence on any data driven measurement system in Lean literature review. Leyer and Moormann (2014) suggested that financial services were interested in Lean to effectively respond customer behaviors' patterns, competition, regulatory and technological changes, and cost efficiencies. The adoption of Lean in the services sector is based on the five common Lean principles: identify value; map the value stream; improve flow and eliminate waste; implement pull; and strive for perfection (Gupta et al., 2016). Wielki and Koziół (2018) highlighted research by McKinsey and Co. Scanning 50 installations in data centers, the analysis shows an increase in efficiency. The result is a 50%–80% reduction in system recovery time after a failure and a 10% increase in service-level agreement (SLA). The maintenance efficiency has increased from 15% to 25% and the time to market for services has been reduced by 25%. However, If Lean is implemented without Six Sigma, then there is a lack of tools to leverage the improvement to its full potential Pepper and Spedding (2010) argued.

4.3 Six Sigma

Some early scholars (Harry & Schroeder, 2000; Henderson & Evans, 2000) formulated Six Sigma as a well-known OM practice pioneered in the 1980s by Bill Smith of Motorola. Later it became popular as a business strategy during 1995 when it was applied in General Electric (GE) by Jack Welch. Mathematically is represented as six standard deviations from the arithmetic mean. In its simplest definition, it is known as a problem-based approach to solving a definite problem in the organization (Hammer, 2002). Kumar et al. (2008) highlighted that the most common myth of Six Sigma is that it is cut only for manufacturing, leading to slower adoption of the methodology in service sectors (Furterer & Elshennawy, 2005).

With GE implementation, Six Sigma took off application in other organizations. First, GE must give credits for first identifying the MAIC framework's shortcoming by adding the Define (D) step transforming in what is known as DMAIC. Also, Design for Six Sigma is developed in GE Define-Measure-Analyze-Design-Verify (Antony et al., 2012;

Kaid et al., 2016). Perhaps this advantage of wide adoption LSS in the USA is one of the reasons why LSS experts in the US differ from LSS experts in Europe.

Like Lean methodology, Six Sigma also encountered some criticism. Many organizations perceive Six Sigma as a pure statistical toolkit rather than as a management strategy (Gamal, 2010). Some still question whether these benefits sufficiently exceed the costs of adoption (Swink & Jacobs, 2012) and others consider the high degree of statistical techniques hard to comprehend (Sunder, 2014). However, Sunder and Antony (2015) argue that Six Sigma focuses on reducing process variations and promotes a process thinking mindset in organizations. Lean and Six Sigma complement each other in the sense that it accelerates Six Sigma, thereby delivering more outstanding results than typically could be achieved by lean or six Sigma individually (Improta et al., 2019).

4.4 From Lean, Six Sigma to Lean Six Sigma

The word "Lean Six Sigma" was used to represent a system that combines both Lean and Six Sigma in a book named "Leaning to Six Sigma" 2000 by Sheridan (2000) and Wheat et al. (2001). "The Path to integration of Lean Enterprise and Six Sigma" Six Sigma became more popular due to the publications of M. L. George (Byrne et al., 2007; George, 2002) discussed the possibility of a merger between Lean and Six Sigma to achieve world-class performance. Lean and Six Sigma are two different process improvement strategies, which aim at delivering bottom-line benefits (Antony 2011; Kumar et al. 2006; Shah, Chandrasekaran, & Linderman 2008).

There is a lot of available evidence in the literature that supported LSS integration and highlighted the positive impacts in organizational performances available in the literature that have supported the possibility of integrating LSS and their favorable impacts on corporate performances (Antony et al. 2019; Antony et al. 2011; Assarlind et al. 2013; Sunder et al. 2013; Sunder et al. 2018; Shah et al. 2010). Shah et al. (2008) searched for the pattern on the implementation of Lean and Six Sigma 2,511 plants and concluded that plants using Lean implementation with Six Sigma were getting more easy deployment of tools. Chen, Li, and Shady (2010) summarized that the LSS strategy aims at improving the business process by removing process variations and inefficiencies that exist in the manufacturing process.

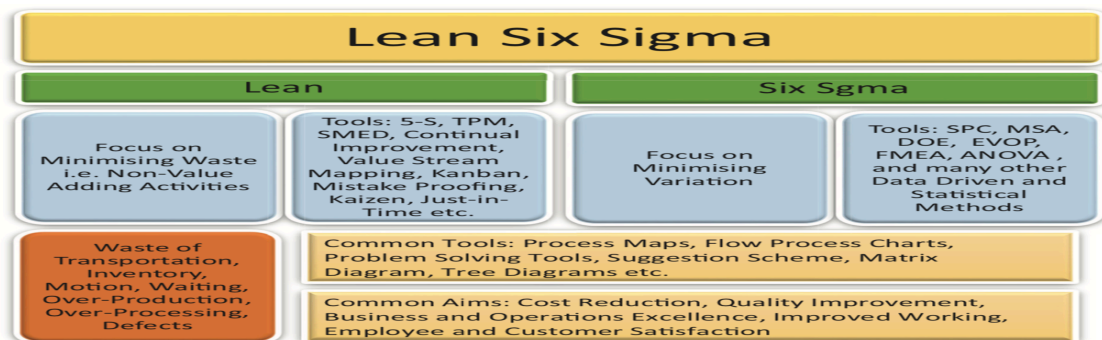
While (Garza-Reyes et al., 2016; Snee, 2010) stated that LSS is a systematic approach that improves the system's performance based on quality, cost, and customer satisfaction. With a combination of Lean thinking and Six Sigma, Yeh et al. (2011)

noted that LSS had become one of the best tools for the health care system because it deals with crucial needs inpatient care and safety. Manville et al. (2012) mentioned that LSS could be considered a strategic business tool in following an approach, which deals with a particular business situation or circumstance.

Albliwi et al. (2015) provided a systematic review for LSS in manufacturing and services, highlighting positive themes such as motivational factors and benefits. Ben Ruben, Vinodh, and Asokan (2017) argued that Lean Six Sigma is a systematic data-driven methodology that integrates two powerful business improvement strategies Lean Manufacturing and Six Sigma, to remove wastes and reduce process variation. Many scholars have considered LSS a broad well-structured, systematic, strategic, integrated, and long-term decision-making approach to improve quality, cost, speed, delivery, and customer satisfaction performance (Andersson, Hilletoft, Manfredsson, & Hilmola, 2014; Gutierrez-Gutierrez et al., 2016; Laureani & Antony, 2012; Nicoletti, 2013; Ray & John, 2011) (Figure 2).

Figure 2

Lean, Six Sigma and Lean Six Sigma Description.



(Yadav et al., 2021)

Antony et al. (2017) think that the merger of the Lean manufacturing concept with the Six-Sigma methodology mainly as the cost reduction mechanism to assist organizations in improving business performance and overall efficiency. By using speed and reduction features of Lean and, at the same time, variation detection/ reduction from Six Sigma, this combined approach solely emerges as a methodology for achieving best-in-class quality. According to Singh and Rath (2019), Lean Six Sigma is an organized strategy from a business perspective that enables industries to recognize customer desires effectively, eliminate variability within the production, and reduce all non-value-added activities. Park et al. (2020) pointed out that the important application guideline for Six Sigma is DMAIC (Define, Measure, Analyse, Improve, and Control).

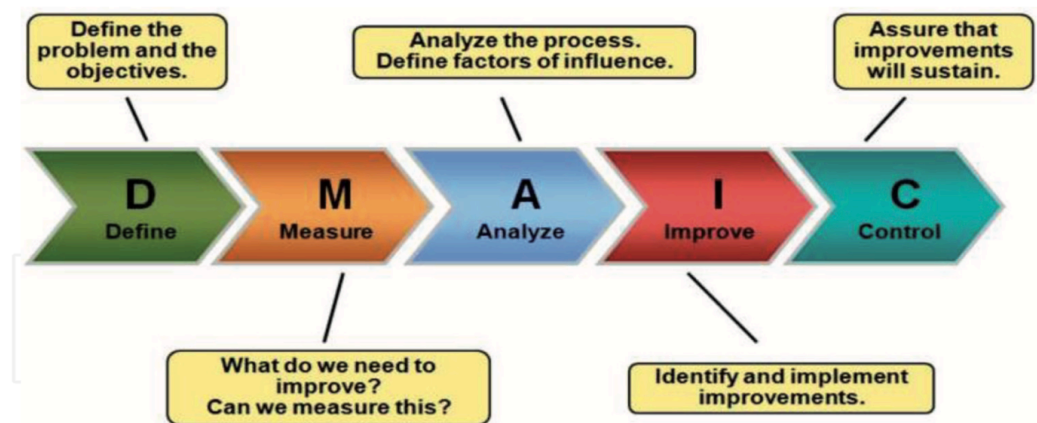
Still, those of Lean are IIFPP (Identify value, Identify value stream, Flow, Pull and perfection). DMAIC approach, which will be elaborated further on in the following subsection alongside some of the most used tools, is an improvement tool of LSS to solve real-time problems in industries today (Adeodu et al., 2020).

4.4.1 Lean Six Sigma Framework – DMAIC

DMAIC methodology is considered the most effective for implementing LSS (Sokovic et al., 2010; Thomas et al., 2008). The main phases of the LSS DMAIC (Figure 3) methodology are:

Figure 3

DMAIC Phases.



(Rastogi, 2020)

Define – What is the problem? Does it exist? It consists of clarifying the project's scope and defining the goals, identifying external factors that can burden the organization, and narrowing down the problem, e.g., using Pareto (Garza-Reyes, 2015; Pyzdek and Keller, 2014; Shankar, 2009). According to Kirkham et al. (2014), this phase is crucial since the projects selected objectively are more successful than those chosen subjectively.

Measure – How is the process measured? How is it performing? The measure phase of DMAIC is when the current state of a problem is researched and documented (Ghaleb et al., 2014; Sahnó et al., 2015). The current situation or problem is documented in this stage, milestones, risks, and corrective actions are created. Pyzdek and Keller (2014) relate this stage with establishing metrics to help to monitor key process characteristics towards the objectives set in the Define phase.

Analyze – What are the most important causes of defects? The analysis phase is characterized by collating all the information obtained in the measure phase and

identifying the root cause of the problem that the project has been established to resolve (Ghaleb et al., 2014; Sahnó et al., 2015). It involves the analysis of the system to identify ways to reduce the gap between the current performance and the desired goals (Garza-Reyes et al., 2014).

Improve – How do we remove the causes of the defects? The improvement or implementation phase is when the selected solution during the analysis stage is implemented (Ghaleb et al., 2014; Sahnó et al., 2015). As the result of the new solution implemented, the first output will be measured towards objectives settled in the beginning.

Control – How can we maintain the improvements? According to Patel (2011), the purpose of this phase is to lock in the benefits achieved by doing the previous stages and report any deviations from the goals established in the define phase.

Albliwi et al. (2015) highlight that the adaptability of LSS was the driving force to become the most popular business strategy for deploying a continuous improvement (CI) approach in the manufacturing and service sectors. Alongside DMAIC there is one more method named DFLSS (design for LSS) or DMADV, which again employs five phases: define, measure, analyze, design, and verify, and aims to replace existing systems with new processes (Albliwi et al., 2017). Implementing the DMAIC model is not that much connected with money but the development of belt-based training infrastructure, which is expensive (Fonseca Amorim et al., 2018). On the other hand, many researchers have been strongly opposing the idea of DMAIC implementation with belt base training infrastructure (Ben Romdhane et al., 2017; K & K 2019). Juliani and Oliveira (2020) summarized in their research strategic human aspects and decided not to treat the DMAIC in isolation with five stages. The DMAIC can be seen as a simple and powerful five-stage method but with reduced strategic capacity, which means that it is possible to implement LSS without DMAIC if the organization can successfully differentiate the right strategies and tools. When goal difficulty is severe, the use of the LSS tool leads to higher performance. Hence having knowledge of the most frequent tools from both practitioners and experienced will lead to superior performance (Linderman, Schroeder, & Chino, 2006; Uluskan, 2016; Uluskan, 2019).

4.4.2 Some Lean Six Sigma Tools

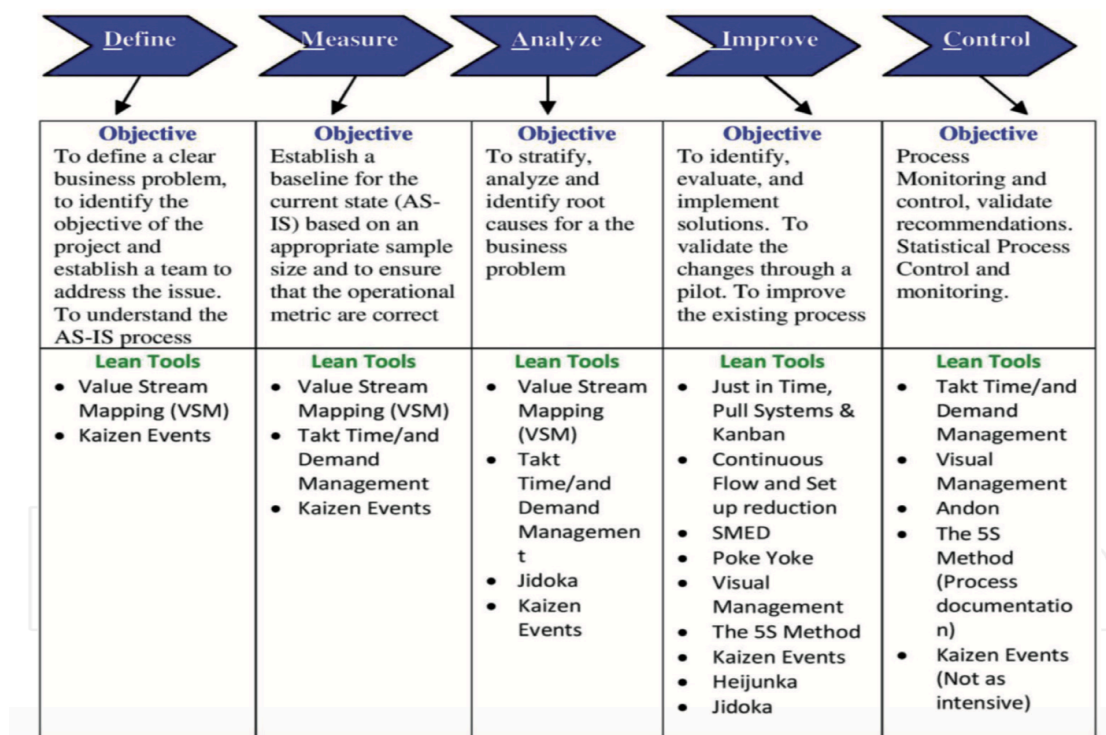
According to Antony (2006), a tool is used for a particular task and usually has a narrow focus. In contrast, a technique has wider application and can be viewed as a collection of tools. Basu (2009) considers fishbone, Pareto, and control charts as tools while

failure mode and effects analysis (FMEA) or statistical process control (SPC) can be qualified as techniques (Basu, 2009). Since techniques are regarded as a collection of tools, Uluskan (2016) suggested for simplicity reasons to use the term tool for both of these notions. One of the earliest studies that looked into the most frequently used LSS tools is the study by Antony and Banuelas (2002), carried out the earliest study in Britain in relation to the most frequent LSS tools. They concluded that the cause-and-effect diagram, control charts, and Pareto analysis were most used, whereas QFD, FMEA, and 5S were the less frequent ones. Antony and Desai (2009) listed brainstorming, cause-and-effect analysis, Pareto analysis, process mapping, and project charter as the most used problem-solving tools.

On the other hand, Duarte (2011) identified that LSS was widely recognized and been adopted by many companies Ford, 3M, Honeywell, etc. At the time of reporting from Duarte, LSS was carried out by 35% of companies listed in Forbes's top 500's list. He introduced an illustration of how tools can be integrated within the DMAIC cycle, as shown in the following picture.

Figure 4

Some Lean Six Sigma Tools.



(Duarte, 2011)

Three years later, Miguel et al. (2012) highlighted that data collection, histogram, Pareto diagram, brainstorming, and SPC as the most frequently used tools, while the least preferable tools were process decision program chart, operational testing,

stakeholder analysis and fault tree analysis. In 2017 Ben Ruben et al. (2017) practically validated the benefits of using the DMAIC framework in large Indian automotive component manufacturing. The main tools (Figure 4) used were Value Stream Mapping (VSM), 5S, Kaizen, Cause and effect diagram, Quality Function Deployment (QFD), High-level SIPOC, Eco-QFD, Pareto chart, Environmental VSM (current level). Raval and Kant (2017), in their literature review related to LSS frameworks, observed that the main elements used were incoherent. This was mainly due to different frameworks used for different situations for different issues of Lean, Six Sigma, and LSS. The most common tools used were the DMAIC approach, Cause, and Effect diagram, Pareto Chart, Value Stream Mapping. They argue that no standard set of elements exist that can be used to develop a framework exclusively for LSS alone and still is missing. Raval, Kant, and Shankar (2018b) analyzed 51 LSS tools in their research. They categorized them based on their usage following the DMAIC stages. For instance, when the team focuses on planning their implementation, the main tools used are SIPOC and process map in the define stage. At the same time, the deliverables are current situation, desired situation, and confirmed goals. In the measurement stage, cause and effect, normal distribution or failure mode and effect analysis (FMEA) take place detailing the output in process maps, critical to quality/ customer and delivery performance data. Whereas in the analyses phase, Pareto and fishbone are majorly utilized. The feedback from the analysis phase is used as input in the improvement stage. In the control phase, tools like process map, control chart, and data collection sheet are used for monitoring to detect any deviations. Meanwhile, Uluskan (2019) conducted a comprehensive study on the LSS toolkit available in practice and literature. She compared the literature of 68 LSS tools with on-field data from practitioners (Table 2).

Table 2*LSS Toolkit.*

The most used tools mentioned in the literature	The most used tools found in the current study
Pareto Brainstorming Process map Fishbone diagram Trend analysis Statistical process control Measurement system analysis Control list, control charts Benchmarking Sampling Data collection Graphical analysis Histograms Run chart	Pareto histograms, Pareto Brainstorming Process flow diagram Fishbone diagram Trend analysis (Run chart) Process sigma Measurement system analysis Control charts Voice of customer Data normality test Operational definition Data collection plan SIPOC
The least used tools mentioned in the literature	The least used tools found in the current study
Taguchi Kano model Quality function deployment Poka-Yoke 5S Design of experiments SIPOC	Taguchi's Loss Function Kano model QFD Activity network diagram Involvement matrix Principal component analysis Structural equation modelling Artificial neural networks Pugh matrix

(Uluskan, 2019)

These specific tools are SIPOC, the voice of the customer (VOC), and critical to quality (CTQ). She found out that the voice of the customer (VOC) is not sufficient for finding the problem, which means that the very well-known philosophical underpinning customer-centric detection problem is not enough. Hence is needed more proactive approach based on day-to-day operational activities. She suggests that it is necessary to have multidimensional knowledge of the LSS tools to implement successful projects. Walter and Paladini (2109) studied Brazilian industries where LSS was adopted. They found out that the six most frequently used tools in LSS applications were: "Control Charts," followed by "Value Stream Mapping," "DMAIC," "Kaizen," "Ishikawa Diagram," and "Histogram;" and Control chart is the top-ranking tool. In the following section, the researcher will review some of the main LSS tools.

4.4.2.1 Kaizen Events

Kaizen (改善 in Kanji) is a Japanese word that indicates a process of continuous improvement (CI) of the standard way of work (Chen et al., 2000). According to Palmer (2001), Kaizen (Figure 5) is a compound word involving two concepts: Kai (change) and Zen (for the better). Brunet and New (2003) concluded that Kaizen evolves uniquely within each organization, whereas Bateman (2005) noted that Lean-Kaizen implementation improves the performance in the internal and external quality of service

processes. Bhuiyan and Baghel (2005) illustrated that a continuous improvement program helps in identifying and eliminating wastes in the production line and improves the quality of the product. Meanwhile, Farris et al. (2009) define the Kaizen event as "a focused and structured improvement project, using a dedicated cross-functional team to improve a targeted work area, with specific goals, in an accelerated timeframe".

Figure 5

Kaizen.



(Malik & YeZhuang, 2006)

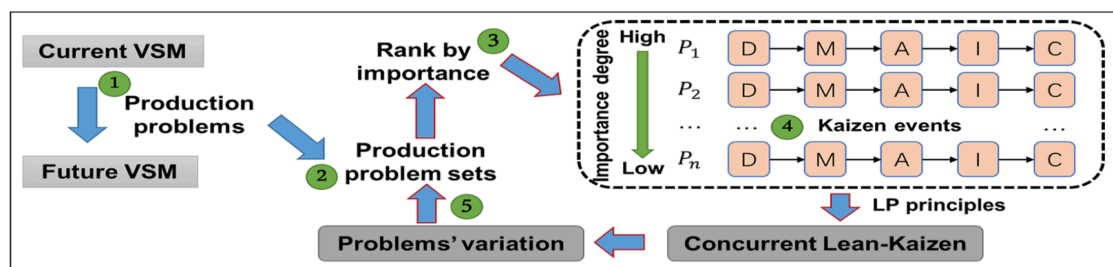
Van Aken et al. (2010) inform that a Kaizen event aims to gather operators, managers, and owners in one place to map the existing processes and improve them. They continue to gain popularity among many organizations as a process improvement initiative, often implemented with lean practices. Chen, Li, and Shady (2010) propose using Kaizen events to bridge the gap between current and future states in the process under investigation. Singh and Singh (2012) detail that the current state map provides a pictorial view of existing processes identifies gap areas and guides future state maps. According to Prashar (2014), Lean-Kaizen is a relatively novel concept; it is a straightforward improvement technique that assists in eliminating different inefficiencies in the organization. Cheng, L. J. (2018) claims that Kaizen is not just a theoretical or written paper; it requires improvement skills to solve root problems. If organizations plan to use Kaizen, they should take into consideration three aspects: a-) Knowing what to do in implementing Six Sigma under a Kaizen event b-) Employee involvement is the key critical success factor c-) Based on customer orientation. Kumar, Dhingra, and Singh (2018) showed that Lean-Kaizen using the VSM tool is an effective and reliable improvement technique, which helps to tackle all types of inefficiencies in organizations. They suggest that this method can be applied to all kinds of products, procedures, and processes to tackle inefficiencies and achieve improvements in system

4.4.2.2 Value Stream Mapping (VSM)

Singh and Sharma (2009) argue that VSM is a dominant tool that helps an organization to improve the understanding towards lean, while Singh, Garg, Sharma, and Grewal (2010) applied VSM to bridge the gap between the current state and future state of the production industry. In contrast, Singh, Garg, and Sharma (2011) concluded that VSM is a valuable practice for identifying and eliminating various wastes. According to Bhamu and Sangwan (2014), VSM is a powerful diagnostic and planning tool but sometimes fails to propose feasible solutions.

Figure 6

VSM Sample.



(Guo et al., 2019)

Anyway, Dinis-Carvalho et al. (2015) suggest that identifying and locating waste are the preliminary steps for Lean-Kaizen. For them VSM is the most used Lean tool for representing production flows and identifying some types of waste. They presented a set of mapping tools and linked them to the identification of the wastes. Guo et al. (2019) confirm that VSM is a visualization Lean-management method for identifying product problems by finding gaps between current VSM and future VSM (Figure 6). On the other hand, they think that VSM and DMAIC have their own advantages and disadvantages; VSM can easily and accurately identify product problems but do not offer an idea to tackle them, and DMAIC offers a structure for problem-solving but lacks in identifying problems. (Guo et al., 2019). Hartini et al. (2018) argued that improvised Lean Management tools like VSM can better visualize sustainability performance assessment. Riding on its demonstrated capabilities, VSM is currently being practiced extensively with even modified versions that integrate sustainability features (Gholami et al., 2019).

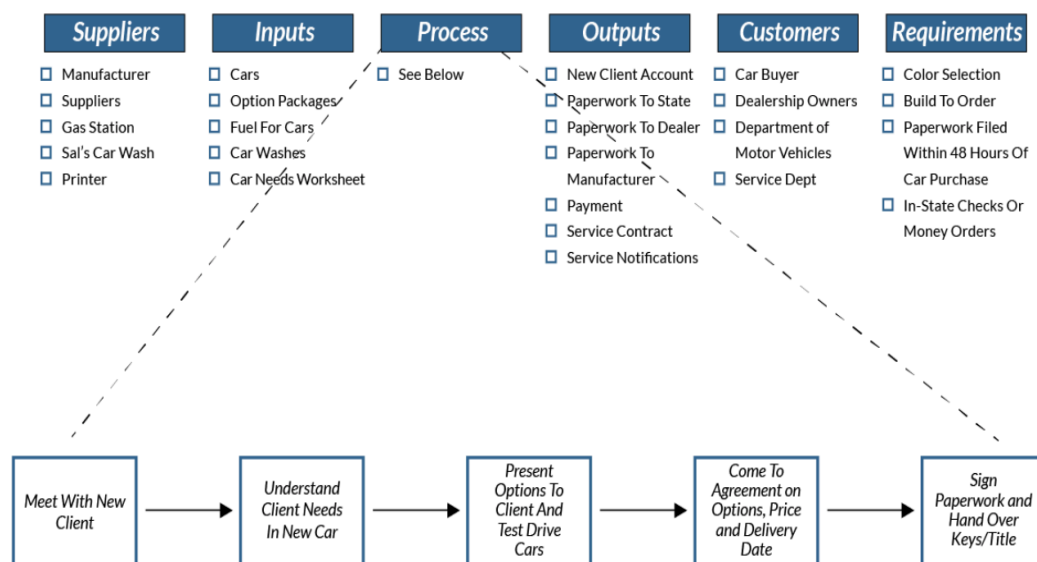
4.4.2.3 Supplier-Input-Process-Output-Customers – SIPOC

According to Enoch et al. (2009), SIPOC is a visual tool to define a complex project and is typically employed at the Measure phase of the Six Sigma DMAIC (Define,

Measure, Analyze, Improve, Control) methodology, and it stands for Suppliers, Inputs, Process, Outputs, and Customers. Marques and Requeijo (2009) used 'SIPOC to map the processes and help the main stakeholders to manage the key processes. Mishra et al. (2014) that Six Sigma (DMAIC) with the integration of the SIPOC model (Figure 7) has been established as a winning practice in improving the manufacturing process, which has encouraged the various stakeholders to use it for improvement in their processes and identification of KPIs. Hájek et al. (2015) stated that the benefits of using flowcharts for graphical presentation of work activities are that they allow process improvement, analysis, and process management, and tools provisions for learning the steps of the process.

Figure 7

SIPOC sample.



(Simon, 2020)

According to Maier et al. (2017), the SIPOC method involves a matrix of processes to identify, characterize and assess the processes, thus enabling the analysis and assessment of the aspects that should be improved or changed. Therefore, there is a great deal of confusion in its application between input and the outcome of the activity. On the other hand, Darvish (2017) argues that SIPOC is not concerned with the outcome of the activity. They insist they shouldn't as they address two types of different yields. Félix and Duarte (2018) inform that SIPOC was one of the most important tools in this work. By breaking down our process into external inputs and their suppliers, process steps, outputs, and customers, SIPOC helped the team identify whether they

focused on the right strategy. For Bridghes (2018), SIPOC is a tool that perfectly summarizes the inputs and outputs on one or more processes in table form. She suggested that the term SIPOC originates from the 1980s as part of the total quality movement, while today is part of lean manufacturing and business process management.

4.4.2.4 Pareto Analysis

Karuppusami and Gandhinathan (2006) state that the Pareto chart ranks the data from the highest to the lowest frequency of occurrences. And it is applied with cause-effect analysis for identifying and analyzing defects in products (Paul and Azeem, 2009). According to Surbone et al. (2010), the Pareto principle was developed by Vilfredo Pareto, an Italian economist and sociologist. They conducted a study in Europe in the early 1900s on wealth and poverty. The underlying explanation of the principle is the 80/20 rule which means that for most of the phenomena, 80% of the consequences originate from 20% of the causes. Patyal and Maddulety (2015) noted that cause and effect analysis is the basic tool of TQM. Pareto uses bar diagrams to sort problems based on frequency, severity, nature, or source and determine which problems are vital (Benjamin, Marathamuthu, & Murugaiah, 2015). However, Hossen et al. (2017) express concerns since Pareto has difficulty dealing with issues and recommend the integration of multi-criteria decision-making tools. Kumar et al. (2019) praise Pareto analysis as a statistical tool for ranking data by occurrences from the highest frequency to the lowest frequency. By focusing on the major problems first, one can eliminate most of the problems.

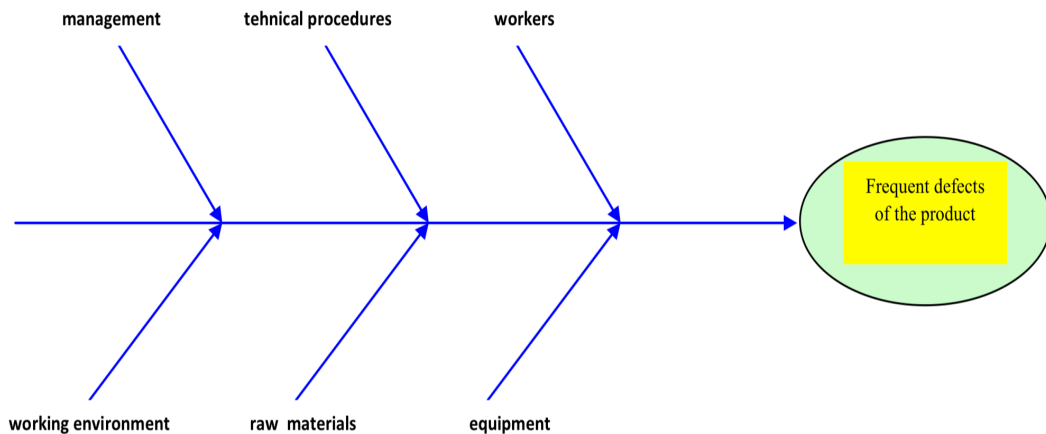
4.4.2.5 Fish Bone Analysis

. A fishbone diagram with a shape that is like a fish skeleton is a common tool used for a cause-and-effect analysis to identify a complex interplay of causes for a specific problem. It was created by Ishikawa (1990) in the research field of management. Fishbone Diagram is an analysis tool to see and find the causes of a problem contributing to it systematically (Watson, G 2004). As Dogget (2004) suggests, before solving the problem causes of that problem should be understood and identified to have a straightforward solution. Ilie and Ciocoiu (2010) said that the fishbone diagram is used in Analyze phase of DMAIC and is created to identify and classify the causes of a problem. Kang et al. (2011) Fishbone Diagram is a diagram that is used to investigate the natural causes or potentials of a problem. According to Ayverdia et al. (2014), the Fishbone diagram can be used as an appropriate visual representation of phenomena

that involve the investigation of multiple cause-and-effect factors and how they inter-relate.

Figure 8

Fishbone Diagram.



(Loredana, 2017)

Loredana (2017) explains that each cause or reason for imperfection is a source of variation (Figure 8). Causes are usually grouped into major categories to identify these sources of variation. Such as People, Methods: procedures, Machines, Materials: Environment Shinde (2018) thinks that by using the Fishbone diagram, it is easy to reach the root cause of the problem and identified the major aspects of the source of problems in the case investigated. Gerardi (2018) argues that it is difficult to represent the interrelated nature of the problem in complex situations because it allows a team to focus on the problem instead of the issues associated with the problem (Lotich, 2020). According to Meylani et al. (2018), the implementation of fishbone diagrams fostered students in analyzing, finding, and identifying factors affecting a problem more deeply. Coccia (2018) concludes that fishbone diagram is a general technique of graphical representation to explore and categorize, clearly and simply, the potential root causes of the evolution of technological innovations for proper management of technology.

4.5 Lean Six Sigma in Manufacturing

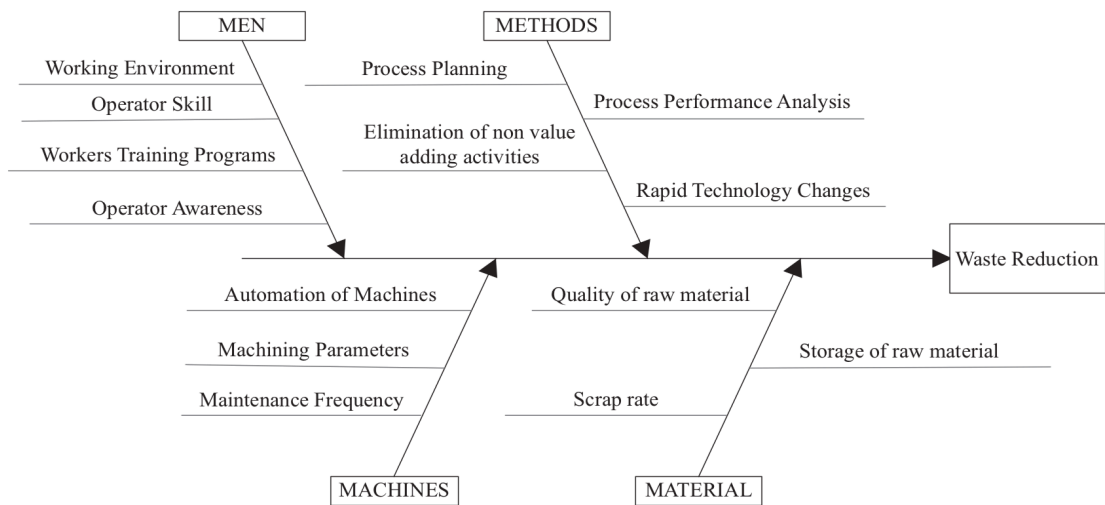
According to Kumar et al., 2006 Lean Six Sigma combines the variability reduction tools and techniques from Six Sigma with the waste elimination techniques from Lean Manufacturing. To measure the performance, Setijono and Dahlgaard (2007) conceptualized the link between the customer and waste eliminated. Hence the performance is measured in terms of relative performance to quality, relative

performance to time, and relative performance to the cost. In comparison, Hu et al. (2008) developed a unique decision support system that utilizes a lean six sigma multi-objective formulation for project selection in manufacturing and helps corporate executives to identify the optimal project portfolio for Lean Six Sigma deployment. Atmaca and Girenes (2013) acknowledge the combination of Ford's Lean manufacturing with Six Sigma by Motorola as the last evolution step in manufacturing history. They aim towards operation excellence, which means applying the changes first and acting quickly. Many scholars agree that the most prominent barriers in LSS applications in manufacturing are lack of management support, proper training, knowledge, and awareness (Antony, 2008; Antony, 2012; Prashar, 2014; Gamal Aboelmaged, 2011; Mohamed, 2011). Shah and Shrivastava (2013) developed a performance measurement instrument to evaluate the performance of LSS in manufacturing and prioritize the efforts in implementing the synergies. Elnamrouty and Abushaaban (2013) describe some of the waste in manufacturing services, such as overproduction, defects, inventory, over-processing, and waits were found in healthcare services as well. Manufacturing companies have implemented LSS to find the right balance between quality, cost, and delivery (Antony, 2014) in a continuous improvement approach (Assarlind et al., 2013). Tenera and Pinto (2014) proposed an LSS project management amendment based on the DMAIC approach and a set of statistical tools for selecting the best project that supports process improvement. Maldonado et al. (2014) developed a theoretical LSS framework that combines an ergonomic compatibility evaluation model for the selection of advanced manufacturing technologies in LSS projects. Albliwi et al. (2015) highlight that LSS has become the most popular business strategy for continuous improvement (CI) in the manufacturing, service, and public sectors. Cherrafi et al. (2016) think that all the models and frameworks are built in the culture of continuous improvement, and most methods are related to PDCA, DMAIC, or Kaizen events. On the other hand, Shokri et al. (2016) argue that very little research has happened to investigate the relationships between CSFs and any barriers to LSS implementation in the manufacturing sector.

Letens et al. (2016) proposed a multilevel Lean model for product development systems and designing using Ishikawa chart. As illustrated in Figure 9, there are four critical aspects related to the management of waste in manufacturing named Men, Methods, Machines, and materials.

Figure 9

Ishikawa chart for process improvement.



(Letens et al., 2016)

Zahraee (2016) concludes that the most critical issue in manufacturing is delivering products fast, high quality, and low cost. Conducted a study to provide an overview of current LSS Certification practices of different manufacturing industries Laureani and Antony (2017) conducted research about LSS certifications in manufacturing introducing best practices that practitioners have to follow to get the certification. Singh et al. (2019) valued the DMAIC procedure as a groundbreaking philosophy for LSS ventures.

However, Sodhi et al. (2019a) have to be credited for achieving the LSS venture to the executives' introducing advantages of the DMAIC technique. According to Sodhi et al. (2020), Six Sigma and Lean have similar objectives regarding waste disposal but apply different techniques to reach the objectives. Lean assembling is the precise method for disposing of waste, whereas Six Sigma provides strategies to decrease imperfections. In today's era, manufacturing organizations face many problems such as low-quality products, high production costs, supply chain delivery issues, etc., most of the time caused by a lack of appropriate operational strategy. Swarnakar et al. (2020) firmly argue that adapting the right strategy could solve all the above issues. In this context, it is crucial to realize that LSS implementation in manufacturing differs from LSS in services and that differences shouldn't be neglected.

4.6 Lean Six Sigma in Services

LSS in services offers enormous opportunities for improvement. According to George (2003), three are the main reasons for implementing LSS in services: services are usually slow, expensive and they are slow because there are too many "Work-In-Progress (WIP). In any slow process, 80 percent of the delay is caused by less than 20 percent of the activities. Following Popa et al.'s (2005) descriptive approach of LSS is a methodology of process improvement used to eliminate waste and deliver products and services with very high quality.

The integration of Lean and Six Sigma allows different organizations to incorporate problem-solving with analysis tools that make sense (Andersson et al., 2006). Mader (2008) suggests that LSS uses tools from both toolboxes to get the synergetic best of the two methodologies, increasing speed and improving accuracy. According to Allen and Laure (2006), this synergy provides better results in every discipline. LSS is a powerful strategy for process management because eliminating defects and reducing variation leads manufacturing and services organizations towards business process excellence (Snee, 2010). When it comes to services Nakhai and Neves (2009) differentiate them into two types of services: process-based such as banking, telecommunications, public services, etc., and knowledge-based such as education, legal, or healthcare services. They complain that LSS is focused on highly repetitive processes replicating similar characteristics with manufacturing.

Unlike manufacturing, where LSS starts from receiving raw material to manufacturing finished goods, in-services, LSS starts from customer perspectives to eliminate waste until the service is delivered (Delgado et al., 2010; Swarnakar and Vinodh, 2016). LSS can be the systemic tools that public services are looking for to improve the quality of their services and goods (Hoerl and Gardner, 2010; Elias and Davis, 2017). In universities, LSS could become a very good tracking tool. Antony et al. (2012) express concerns that are not widely adopted due to the already known bias that LSS is only meant for manufacturing. Additionally, the decentralized nature of traditional universities also contributes to the slow adoption of LSS in higher education (Svensson et al., 2015). Lauren et al. (2013) summarized how LSS helped healthcare services overcome the challenges and establish an error-free workplace.

Deblois and Lepanto (2016) reviewed the applications of Lean and SS in acute care, highlighting some impacts on care processes, quality of care, and economic aspects. Antony et al. (2016) showed the role of LSS in making organizations in the UK public

sector more effective and efficient using the Bedfordshire Police case. To have successful LSS application in healthcare, Yaduvanshi and Sharma (2017) suggest that the hospitals must first work to build an organizational culture that is acceptable to lean thinking. The commitment must start from the top management, and the junior staff must be involved. Thomas et al. (2017) developed a new LSS framework for improving the curriculum and delivery in higher education and measured the positive impact of lean on student performance. Sunder and Mahalingam (2018) pointed out in their case study that using LSS in the central library improved by 30% of students' inquiries. Management foundation is considered essential for adopting LSS in the public sector, Fletcher (2018) argues.

Establishing and fostering a culture within the organization is a needed foundation and framework for the successful implementation of LSS. Human and technical aspects are equally relevant in the LSS implementation and management, and many authors agree that there is a lack in the LSS literature concerning a generalized model applicable to different business converging divergent views (Raval, Kant, & Shankar 2018a; Singh & Rathi 2018; Sunder, Ganesh, & Marathe 2018). Therefore, in light of the increasing importance of the service sector, Caiado et al. (2018) advise that it is necessary to view services as a system considering LSS a strategic approach that places the customers at the center and invests in mechanisms of engagement of the employees at the team and individual levels. Human behavior increases complexity in the entire process; hence Li et al. (2019) suggest that Top management should avoid jumping to conclusions. Instead, they have to follow the DMAIC structure. Communication between the project team and top management plays a critical role. Training top management of basic LSS philosophy and indirectly leading them in the right direction should also be part of the DMAIC approach, they argue. To meet training growth, Purdue University has created LSS certificate programs that are 100% online and instructor-led and offer the following LSS certificates for professionals at every stage of their career path (All campus, 2021). In the meantime, Juliani and De Oliveira (2020) suggest focusing and working more towards challenges, limitations, and literature gaps about Lean, Six Sigma, and LSS because they have existed for quite some time.

4.7 Limitations of Lean, Six Sigma and Lean Six Sigma

Despite the notable success of LSS implementations in large western companies such as Honeywell, GE, Johnson & Johnson, Bank of America (Laureani & Antony, 2012; Snee, 2010), not all organizations have enjoyed the same benefits for LSS applications

(Chakravorty, 2009; Glasgow et al., 2010; Kumar et al., 2007, 2008). Since the beginnings, some authors (Hoerl, 2001) argued that there is no standard procedure for accrediting Six Sigma programs, which turned organizations in some cases to claim they were not following the true Six Sigma. When it comes to the Lean concept, Spear (2004) claimed that many organizations perceived Lean as a set of tools rather than as a process improvement (PI) philosophy that led to confusion in attempts to motivate the employees. In the light of these attempts, Bendell (2006) argued that LSS could dilute the effects of Lean and Six Sigma due to the lack of tailored LSS training programs and the lack of framework for LSS implementation (Kumar et al., 2006).

Bert (2007) highlights that the costs associated with implementing Six Sigma in the early stages are high, with low accrued benefits (Foster et al., 2007). At that time, two big US corporations withdraw from those initiatives due to customers' negative impact (Chakravorty, 2010; Hindo, 2007). Some authors explain Six Sigma adoption as a culture fit (Schön et al., 2010) with penetration in the US higher than Europe (Klefsjö et al., 2008) and in Asia (Krishna et al., 2008). Del Angel (2008) thinks that Six Sigma's rigorous, structured analytical method can lead employees towards rigidity. Still, this opinion was opposed later by Hoerl and Gardner (2010), who suggest that Six Sigma fosters innovation.

Besides billions of dollars documented savings from individual companies, including Bank of America, Six Sigma has proven to be the most effective process improvement method in history. In their opinion, it continues so, and since lean enterprise approaches blended with Six Sigma projects, the breadth of application has expanded further. Chakravorty (2009) said that Six Sigma starts off well, like any other quality improvement initiative, but it fails to have a lasting impact as time progresses. Meanwhile, Maike et al. (2009) found out that the bottom-up approach of Lean is creating problems in getting an organization's leader commitment. In the public sector, where user and stakeholder requirements are greater than other sectors transferring LSS concepts from manufacturing is causing problems, Moullin (2009) argued. He suggests LSS tools shouldn't be used to simply replicate what has been successful in manufacturing but rather focus on delivering better end-user outcomes.

Gamal (2010) is concerned that many organizations perceive Six Sigma as a pure statistical tool rather than a management strategy, and it is hard to find significant works to overcome the misconception. Schön et al. (2010) claimed that a poor LSS might harm employee morale and engagement. Gamal Aboelgad (2011) identified 47 barriers

towards Lean and Six Sigma implementations for manufacturing and services and categorized them into seven barrier factors.

It was found that knowledge and support barriers, referred to as soft barriers, were the most challenging barriers to overcome. Antony, Krishnan, Cullen, and Kumar (2012) explored the broad challenges, barriers, and success factors in the application of LSS of higher education. They concluded that the LSS application was in the early stages, and most of the organizations do not fully understand.

Fursule et al. (2012) identified high start-up costs as unfavorable when implementing continuous improvement strategies. Though the practitioner literature provides considerable evidence of substantial cost reduction and other benefits from Six Sigma, Swink and Jacobs (2012) think that there are still some still questions whether these benefits sufficiently exceed the costs of adoption. Radnor and Osborne (2013) brought up some examples when some organizations have taken tools in Lean Kaizen and used them in isolation, which led to some improvement but failed to build the adequate improvement culture through the organization.

Curatolo et al. (2014) undertook a literature review on the use of Lean and identified the lack of a clear methodology in any applications and a lack of maturity in the papers reviewed. In the same year, Thirkell and Ashman (2014) published a case study on the application of Lean within human resource management. They expressed the view that it is too early to assess the suitability of Lean-to education because the role of human resource professionals within Lean is not positively understood. However, at the same time, it is estimated that almost 60% of Six Sigma initiatives have failed (Albliwi et al., 2014; Glasgow et al., 2010), emphasizing the high failure rate of Six Sigma. Albliwi et al. (2014) emphasize that a huge gap that immediately needs to be addressed is identifying critical failure factors (CFF) of LSS deployment for countries in different stages of implementation. On the other hand, there are studies that suggest Six Sigma has resulted in significant savings (Pyzdek et al., 2014). There are only a few numbers of SMEs reporting the low ratio investment to benefits because of that.

During 2015 was experiencing a boom in several papers exploring holistically Lean, Six Sigma, and Lean Six Sigma (Antony, 2015; Thomas, Antony, Francis, & Fisher, 2015). A review of 15 years of literature on Lean in healthcare D'Andreamatteo et al. (2015) found out that lack of shared definition of Lean needs to explore more the integrated version of LSS and to critically review its failures and successes. Critics argued that Lean by itself is not perfect and doesn't necessarily lead to customer satisfaction. e.g., Toyota in Europe is lagging other car manufacturers. According to Bhasin (2015), even

Toyota in Japan failed to meet the customer's orders in some cases. Marodin and Saurin (2015) linked various risks with lean implementation such as management of the process, top and middle management, and staff involvement, where management of the process has the highest risk factor.

Meanwhile, Sunder and Antony (2015) pointed out that Six Sigma focuses on reducing process variations, encourages a process-thinking mindset, and promotes customer satisfaction and innovation (Antony et al., 2016; He et al., 2017).

Raja and Raju (2016) acknowledge that the most important issue remains the lack of a generalized model for LSS implementations for most industries. There is no clear picture of which tool to use in different stages of LSS implementations. LeMahieu et al. (2017) advise that it is perhaps the drive for quick wins in LSS that has driven unsuitability arguments attempting to avoid employees and the voice of customers. Raval and Kant (2017) observed that practitioners proposed fewer frameworks indicating a lack of consultants in developing LSS frameworks in academic journals. Amongst many reasons was their fear of losing monopoly and providing evidence to competitors. They suggest there is a good opportunity for academics to team up with practitioners to construct a superior framework. Yaduvanshi and Sharma (2017) complain that the lack of a holistic approach as a composite model of Lean and Six Sigma in the health care industry in one country is setting a wrong context for the others. In this context, in a groundbreaking publication of using Public Sector Scorecard (PSS) to evaluate and improve public service performance, Moullin (2017) suggests that integration of process mapping, lean management, and system-thinking approaches ensures service improvement is considered in relation to the desired outcomes. Besides, it doesn't stop there, but it also addresses risk management, organization culture, and capability to ensure staff and processes deliver the outcomes. Raval et al. (2018) highlighted that LSS has indeed other hidden impacts rather than financial benefits. As Muraliraj et al. (2018) suggested, it can promote organizational innovation and be integrated with other philosophies (Sreedharan and Raju, 2016).

Ganesh and Marathe (2018) argue that there are large research gaps in understanding LSS from a system thinking perspective. Although it requires considerable works, LSS needs this evaluation.

In a geographical context, it is noticed that the highest failure rate of Six Sigma was in Asia compared to America and Europe. There was a significant difference in means on the non-standardization of the Six Sigma curriculum among the continents. They also recommend that identifying CSFs, deployment models of LSS in healthcare, and the use

of LSS as a decision-making platform in education need further research. The same is needed in banking, telecom, food, and beverages to close the existing gaps. Rodgers and Antony (2019) conducted a systematic literature review on LSS and concluded that critical success and failure factors do not differ too much among various industries.

Antony et al. (2019) think this has been a serious limitation for many years and clearly needs more work to develop a standard curriculum across manufacturing, service, public sector, and even the voluntary sector. Certainly, one difficulty encountered by the authors in deploying Lean Six Sigma is the frequent non-availability of suitable data within organizations. Rodgers et al. (2019) noticed that some authors see Six Sigma as more technical and less easy to implement. They were relying on some statistical tools and therefore speculated that the journey of integration of Lean with Six Sigma may also experience a separate way with only Lean or only Six Sigma application. For instance, they are continually witnessing a lack of broader thinking on continuous improvement in the public sector. Antony, Sony, Dempsey, Brennan, Farrington, and Cudney (2019) argue that the major gap in deploying a successful LSS methodology is the lack of a generic, practical, and user-friendly implementation road map.

Alblooshi et al. (2020) argue that there are no LSS tools to deal with the organization's soft aspects, such as attitude and behaviors. Hence integrating quality improvement approaches with LSS tools positively affects the ability to deal with complex technical processes. The majority of studies primarily agree on the positive effects of Six Sigma, such as cost savings and defect reduction (Gutierrez-Gutierrez et al., 2020).

The integration of Six Sigma with Big Data and Industry 4.0 is becoming a major emerging trend that researchers and practitioners must exploit (Antony et al., 2020). Gaikwad et al. (2020) complained that the literature is either exposed to analyzing the barriers in LSS implementations or strategies to overcome them while missing the link between the barriers and strategies to overcome them. The latest research from Mishra et al. (2021) shows a very high number of participants thinking that LSS requires much time and statistical skills, it is not worth the cost, preferring a cheaper solution like Kaizen. They suggest the LSS implementation costs are the most significant barrier to adopting LSS at large. These costs include the implementation, maintenance, training, and consulting costs are the greatest. Within the operations management theory, LSS has enjoyed significant success in both manufacturing and services. Even though the applicability of LSS is evident in the services sector, academic and practical research on the use of LSS in the Banking and Financial Services (BFS) is limited and deserves greater attention (Sunder, Ganesh, & Marathe, 2019).

In the next section, the researcher will narrow down the review from services as general context to the financial services. He will investigate the main barriers that LSS faces in financial services and close the discussions with the latest trends of LSS in the industry since it is significantly essential to examine the differences of the limitations and emerging trends for any discrepancies (Antony, Sony, & Gutierrez, 2020).

4.8 Lean Six Sigma in Financial Services

Many techniques and tools of Lean and Six Sigma have been extensively used in the manufacturing sector; they are by no means restricted to this domain and can be applied across different verticals (Pande et al., 2000). There was a growing interest in deploying this methodology in healthcare and financial services (Antony, 2004a). Lean Six Sigma (LSS) is a method that can help financial institutions improve operational efficiency and effectiveness (George 2003; Snee and Hoerl 2004). Both manufacturing and service organizations benefited from process improvements. Various methodologies like Plan Do Check Act (PDCA), Statistical Process Control (SPC), Total Quality Management (TQM), Six Sigma, Lean and Lean Six Sigma (LSS) belong to the Process improvement (PI) field. According to De Feo and Babé (2006), some large American financial services like AIG and Bank of America JP Morgan Chase heavily relied on the Lean Six Sigma approach. In Europe, this methodology was virtually unknown until the mid of the last decade.

Lieber and Moormann (2004) studied the penetration scale of LSS in the German bank and astonishingly concluded that only 2% of them were using it. Immelt (2006) highlighted that the advantage of LSS over the others is that it puts the Six Sigma tools in the service of a critical goal, and at the same time, uses lean principles to reduce cycle times in the processes. Lean does not possess the tools to reduce variation and provide statistical control, and Six Sigma does not attempt to develop a link between quality and speed (Su et al.,2006). Therefore, applying the integrated version of Lean and Six Sigma in LSS offers useful solutions that can lead to greater efficiency and better quality in the financial services industry (De Koning et al., 2008a; Parveen & Rao, 2009).

Antony and Desai (2009) complained that lack of knowledge in LSS is the most prominent reason for not using it, following 70% of respondents in their study. Strategically speaking, Lean is a bottom-up approach, while Six Sigma is a top-down approach Vijaya Sunder (2013) suggests. Assarlind et al. (2013) mentioned that LSS requires too much effort and could become a barrier for future implementations.

Chakraborty and Leyer (2013) stated that banks and insurance companies usually struggle with implementing LSS at the company level. In this context, when applying LSS in financial services, there should be coordination as a lack of common criteria to access the project progress, success, and complexity (Buavaraporn & Tannock, 2013; Hsieh et al., 2012). LSS has been successfully implemented across financial services, and there are many examples like Bank of America, HSBC Holdings, American Express, Standard Bank, etc., that changed their way of working since applying LSS concepts Antony (2014) revealed in a study. He summarized some of the prerequisites that an organization should take into consideration for having success in LSS implementation:

- The goals of LSS should be measurable, relevant, and aligned with organization goals.
- All employees should understand KPI indicators
- Management should understand critical business process associated with these KPIs

Ndaita et al. (2015) analyzed the impact of LSS implementation in national bank of Kenia, acknowledging the positive impacts on customer satisfaction by reducing lead-time by 10%. In bottom line, LSS is a method for improving business processes by focusing on a shorter time frame, improved customer service, and passing on the majority of profits to stockholders (Sunder, 2015). Improvements that sometimes are associates with challenges when LSS is implemented in financial services.

Many scholars have argued that the main challenge in the financial sector during implementation is the lack of a plausible theory, which make it difficult for the organizations to learn and implement the same (Heckl et al., 2010; Lokkerbol et al., 2012; Mahmutaj et al., 2015; Snee & Hoerl, 2007; Wang & Hussain, 2011). Though Lean and Six Sigma have both their origins in manufacturing, LSS has enjoyed significant success in services operations (Sunder, 16a). Financial services organizations have adapted LSS methodology to monitor and control the process performance and sustain their results over time with strict mistake-free concepts (Sunder, 2016b). Alongside with success factors of LSS methodology Vijaya Sunder (2016) suggests that stakeholder involvement in every stage of LSS is important to ensure success. An individual Lean approach could not control the process statistically, whereas Six Sigma cannot eliminate the non-value-adding activity of the process (Kalashnikov et al., 2017). In this context, Antony, Snee, and Hoerl (2017) suggest that LSS should adopt data collection, analysis, and display firmly and steadily to reduce subjective decision-

making. They insist that LSS should better approach the following challenges such as identification and critical problem solving and greater use of system strategic thinking to focus on holistic improvement. It is required to have better alignment between management decisions and strategic objectives when implementing LSS in the organization. This alignment should support the integration of the LSS approach with management policy, training, and development, IT systems, and project management (Sreedharan et al., 2018). They argue that LSS as a major methodology burns most of the time and assets during its execution or implementation phase facing a colossal misfortune when it comes to cash, time, and confidence.

Unlike manufacturing, where the end product is a tangible one, financial services are, by their very nature, bound by time in terms of the processes that are built to deliver an outcome that benefits the customer. Sahoo and Yadav (2018) reported that many users find LSS burdensome and responsible for reducing efficiency. Thus, reducing waste in processes means reducing the time to deliver the outcome. While the process becomes more efficient timewise, Six Sigma tries to perfect the process by continually reducing the variation via statistical tools (Vashishth et al., 2019).

But what could be the main motivating factors that financial services would select to apply LSS in their organization?

Singh and Rathi (2019) think that the usual reasons for implementing LSS are to improve operational efficiency, service quality, standardize and streamline the process, enhance customer satisfaction, and gain competitive advantages. Other factors could be reducing delays and operational times, minimizing administrative inefficiencies, and providing better customer service. Ganesh and Marathe (2019) analyzed a recent market study report published by McKinsey regarding three important drivers for continuous improvement in consumer banks. Firstly, there is an obvious decline in customer loyalty and an increased tendency to jump across remote channels. Secondly, rapid advances in technology and infrastructure (e.g., mobile communications, cloud, big data) will cause greater competitive pressures, with newer players leapfrogging the competition. Finally, an uncertain and volatile macroeconomic environment could affect both the revenue and increase the risk. Furthermore, the risk of fraud associated with new digital banking products creates a compelling case for continuity improvement on processes using structured OM methods like LSS (Sunder et al., 2019).

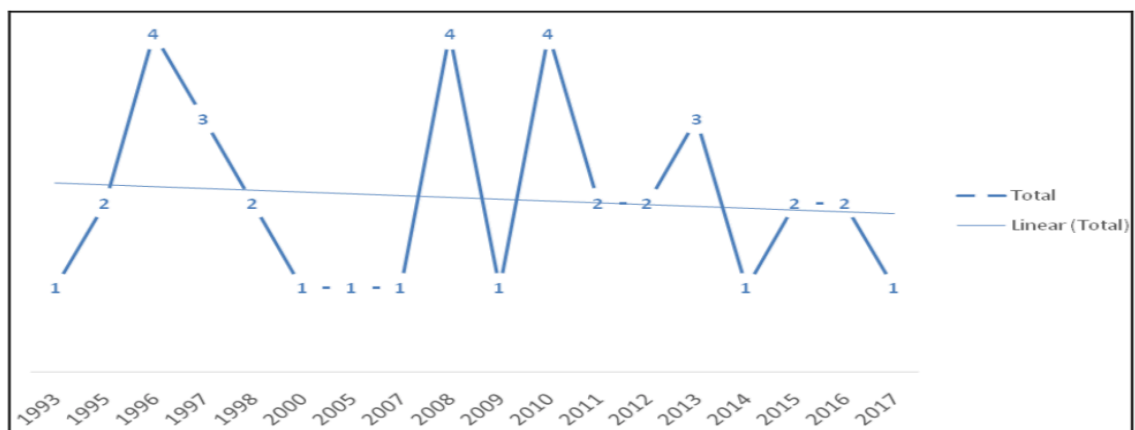
According to them, the published academic research concerning the applicability of LSS in banking and financial services is apparently limited to only five refereed papers in total (Delgado et al., 2010; Lokkerbol et al., 2012; Koning & Does, 2008; Peteros &

Maleyeff, 2015; Wang & Chen, 2010) and none of these are specific to consumer banking context. On the opposite side, Vashishth, Chakraborty, and Antony (2019) have seen an increase in applicability of LSS in the finance sector or departments in other industries like hospitals, power grid, and manufacturing. However, they strongly noted that the lack of a holistic approach to continuous improvement is a natural barrier for financial services. Some organizations choose Lean as their primary continuous improvement methodology, some other organizations utilize Six Sigma, and others choose the combined version of LSS. There is no systematic framework currently available in the literature, which guides organizations to choose a suitable continuous improvement methodology for a given scenario (Vashishth et al., 2017).

LSS deployment in financial services is challenging because services are quite different from manufacturing since financial services are simultaneously produced and consumed but cannot be stored. This adds more complexity to manufacturing, making the application of LSS in financial services more challenging (Vashishth et al., 2019). In line with these concerns, Madhani (2020) describes financial services as intangible despite often including tangible actions, but the final process is intangible. Besides, access to the data collection process in financial services is difficult; hence access to data is challenging. That's why it is hard to identify and measure the opportunities coming from LSS in financial services (Resources, 2020). Sreedharan, Pattusamy, Mohan, and Persis (2020) researched LSS publications in financial services for the last 25 years. The graph shows a steady decline in the number of publications (see the picture below). There is a substantial growing need for publication on LSS in financial services. Figure 10. Year-wise publications of LSS in financial services.

Figure 10

LSS Publications Graph.



(Mohan & Persis, 2020)

They strongly suggest that financial services require the roadmap to implement the correct model of LSS and improve the quality in their organizations. Also, they insisted that the current literature doesn't shed too much light on the infrastructure required to make LSS successful in any financial service sector. In the meantime, Madhani (2020) insists that LSS deployment in financial services operations attempts to build on 'competitive priorities' to do well along with multiple outcomes. Financial services operations are transformed well with LSS to represent various competitive capabilities, but further research are needed since some of these improvements are conceptual by nature.

Patel and Patel (2021) claim that integrating Lean Six Sigma in the era of digitization with approaches such as AI, machine learning (ML), or cloud computing needs to be explored since no article was found in this regard. They argue that the critical success factors in LSS implementations are commitment, involvement, and support of top management, education, and training. Similarly, lack of knowledge about the LSS, lack of resources, lack of top management commitment could become a real challenge for LSS. Yadav et al. (2021) think that the majority of barriers are reported as the opposite of CSF, and barriers other than the opposite of CSF should be explored too. Therefore is of utmost importance to identify some of the main obstacles in Lean Six Sigma methodology (Singh and Rathi, 2021).

4.8.1 Barriers in Lean Six Sigma Implementations - Financial Services

Since Womack et al.'s (1990) publication, a lot of effort has been driven to understand and implement Lean Six Sigma worldwide. Three decades of LSS experience in the automotive industry have generated many examples of successes and failures in other sectors as well; various barriers emerged through these years, some of the cultural and others technical. Identifying them is crucial to successfully implementing LSS (Bhasin, 2012; Mohammad & Mohd, 2015; Netland, 2016; Simões, 2008). Six Sigma is a fact-based methodology, and to determine the sigma value of the performance, a comprehensive data collection process is required (Adams, 2003). There are cases when people participating in LSS projects do not have access to those data, Hensley and Dobie (2005) argued. They suggested that in contrast with manufacturing- data collection and synthesis from human-centric processes in service industries is a problem they should deal with.

Banuelas and Antony (2003) mentioned that selecting the wrong LSS project is a great threat barrier and suggested clearly delineating the problem area to ensure that the project remains manageable and yields a quick success. Heckl et al. (2010) researched LSS implementations in many banks in Europe and concluded the LSS success rate drops down if project goals are unrealistic or if the wrong project is selected since the beginning. Additional factors that result in dissatisfaction with Lean Six Sigma projects are insufficient data quality and quantity and insufficient support from top management. Some employees do not possess the right knowledge to understand the mathematical and statistical nature of some Lean Six Sigma tools, making it difficult for organizations to choose the right ones (Delgado et al. 2010; Heckl et al. 2010). This ambiguity leads to a very long project duration and employee demotivation to pursue the LSS course (Delgado et al., 2010; Mahmutaj et al., 2015). Identifying barriers is an excellent way to develop strategies to overcome them during the initial stage of LSS implementation (Gibbons & Burgess. 2010; Raghunath & Jayathirtha, 2013) because if LSS is implemented incorrectly, it can be costly for organizations Pulakanam (2012) advised. Some authors have concluded that despite the high number of LSS implementations in manufacturing and service sectors, the reviews show a lack of empirical studies of LSS applications in financial services (Buavaraporn & Tannock, 2013; Lokkerbol et al. 2012; Mahmutaj

et al. 2015; Snee, Wang & Chen, 2010; Wang & Hussain, 2011).

Almost the same authors pointed out that financial services need a customized LSS tool kit for them and a roadmap for implementing LSS and the associated infrastructure. These are clearly missing in the existing literature (De Koning et al. 2008; Heckl et al. 2010; Lokkerbol et al. 2012; Mahmutaj et al. 2015; Snee & Hoerl 2009; Sunder & Antony 2015; Wang & Hussain 2011). There are many authors (Assarlind et al., 2013; Muraliraj et al., 2018; Panwar et al., 2015; Raval et al., 2018; Sahoo and Yadav., 2018; Sindhvani et al., 2019; Singh and Rathi, 2019; Soti et al., 2010) that defines the barriers for LSS as the opposite of Critical Success Factors (CSF).

In this context, Muraliraj et al. (2018) cited "Lack of Top Management Support," "Lack of Proper Training," and "Cultural Resistance" as barriers, which are exactly the opposite of CSFs. According to Swarnakar and Vinodh (2016), organizations could only execute the LSS strategy successfully by controlling the barriers. Such a factor creates failure fear across the organization, thus needing immediate addressing before LSS (Yadav & Desai, 2017).

Although some organizations have developed a roadmap internally, there is still no standard framework, or a roadmap on LSS applied to financial services developed and published in the existing literature (Antony et al., 2017).

Sreedharan, Raju, Sunder, and Antony (2018) concluded that most LSS failures have to be seen in two angles: identification of failure factors and ranking the failure factors. The primary barrier in a bank project is linking the aim of the work and the company's strategic goal. There is evidence that when an LSS project is chosen, the employee cannot give an opinion about the project due to poor communication in the organization. It is almost in every LSS publication the importance of top management commitment. It is the most common barrier, and in case of lack of commitment, the failure is obvious (Ambekar and Hudnurkar, 2017). The success of LSS mainly depends upon the analysis and controlling of factors known as barriers of LSS (Raval et al., 2018). These barriers are the interruptions that make LSS application difficult in the business (Sunder et al., 2018). Some managers do not like the statistical methods, and LSS, with no exception, is contributing to inadequate knowledge of main LSS concepts (Sreedharan et al., 2018).

Vashishth, Chakraborty, and Antony (2019) think there is a lack of holistic thinking when implementing LSS in financial services. Some choose Lean, others Six Sigma, and the rest both. There is no systematic framework in literature to guide the financial services for selecting the appropriate methodology. Singh and Rathi (2019) argue that critical barriers identified in literature should be dealt with and tackled in advance. This becomes very important for any organization to know about hurdles in LSS implementation.

Another challenge or barrier is the minimal number of consultants and practitioners publishing regarding LSS applications. Raval et al. (2018) highlighted that academicians contribute most papers on LSS, while practitioners have a low contribution. Sunder, Ganesh, and Marathe (2019) highlighted that despite significant success of LSS in manufacturing and services sectors, it is evident that applicability of LSS in banking and financial sector is limited and deserves greater attention. Earlier on, Sreedharan and Raju (2016) initially emphasized in their literature review that academicians contribute almost 70% of papers on LSS, and only 12.4% of papers originate from LSS professionals. They revealed that the vast majority of LSS publications worldwide are coming from the USA (25%), India (18%) followed by UK and Malaysia respectively, with 7% and 5%. It looks like that in Europe UK is the highest contributor of LSS

implementation paper. The proportion of papers produced by all European countries in total is too low compared to other countries from the rest of the world.

Therefore, there is an immediate need for more LSS publications coming from this area (Panayiotou, & Stergiou 2020). Patel and Patel (2021) observed this phenomenon as well that most of the research articles published are authored by academicians and researchers (80% articles) compared to very few written by professionals and consultants (20% articles). This disconnection between practitioners and academicians can be overcome in case practitioners start publishing their work and academic institutes intensify their interaction with industries (Yadav et al., 2021).

Furthermore, the interconnection of LSS in the era of digitization with the latest trend like AI, machine learning, data science, cloud computing needs to be explored further as no articles were found in the literature review (Patel and Patel 2021). Six Sigma and Lean were combined into Lean Six Sigma (LSS), in the early 2000s and have dominated the quality initiatives ever since. According to Park et al. (2020), we already are in the era of the 4th industrial revolution (IR), which changes almost everything, including LSS and quality management (QM), and is indispensable for the LSS paradigm to evaluate itself in line with emerging trends that 4th industrial revolution is bringing forward.

4.8.2 Emerging Trends in Lean Six Sigma – Financial Services

Antony et al. (2019) suggests that future researches should focus on practical frameworks to blend LSS with Big Data for better fact-based decisions. Given the fact LSS is a data-driven approach for process improvement, particularly in the measurement phase (Snee, 2010), integrating LSS with the emerging trend of Big Data is crucial to bridge that gap (Antony et al. 2017; Antony et al. 2018). Gupta et al. (2019) highlighted that the complementary relationship of Big Data with LSS could improve company performance. They suggest that continuing research on mining, storing, and modeling Big Data with LSS will lead to many practical solutions.

Meanwhile, Mundra and Mishra (2020) argue that the integration of Lean Six Sigma (LSS) with Agile Manufacturing (AM) is one of the prominent strategies that give organizations a competitive edge in these modern ages. Still, most of them fail to implement them. In fact, earlier studies claimed that Lean and Agile could be combined despite coming from different philosophies (Egas, 2015; Suomela, 2015). The book "Lean Integration," suggested that the Lean concept is embedded in Agile where many of their concepts can be aligned. In the same wavelength with them, Schmidt and

Meures (2016) summarized in research that most of the Lean principles have a similar objective with agile principles. Whereas Merzouk et al. (2017) conducted a research study using a hybrid approach combining Scrum (Agile) and Kanban (Lean) to improve software performance metrics. In some cases, Kanban methods performed better than Scrum in terms of managing project schedules (Lei et al., 2017). Jayram (2016) thinks that Six Sigma integration with Industry 4.0 has the potential to make a highly optimized flow defect-free process with minimum wastage.

Basios and Loucopoulos (2017) mentioned that another trend of Six Sigma is the integration with the "Smart Factory" concept part of the Industry 4.0 framework, which implies that machines are connected together and poll, exchange, and analyze data in self-regulated mode (Rüttimann & Stöckli, 2016; Sony, 2018). Arcidiacono and Pieroni (2018) concluded that integrating Six Sigma with Industry 4.0 has reduced operational costs and improved the quality of patient care. In another very interesting approach, Sunder, Mahalingham, and Krishna (2020) blended the Design-thinking framework Empathize- Define-Ideate-Prototype-Test (EDIPT) with DMADV of the LSS framework. When aligned together could lead to a synergetic approach signaling the future direction for integrating LSS with Design thinking. Antony, Sony, and Gutierrez (2020) strongly recommend integration with green initiatives as ultimate environmental impact in the latest call regarding Six Sigma challenges. They argue that such an approach will reduce costs, consumption of raw materials, and emissions.

4.9 Chapter 4: Summary

The aim of the chapter was to critically review the literature about Lean Six Sigma (LSS) in financial services. The research brought forward many authors in an attempt to explore as clear as possible the subject matter. Each section starts with the earliest publications and closes with the latest ones, where the continuity from section to section is softly announced at the end of the previous section. In this way, the context flows naturally and, on the other hand, shows how the context developed through the years.

Research revealed that Lean manufacturing, Six Sigma, and consequently LSS belong to Operation Management (OM) theory. The initial use of the term LSS could be traced back in 2001 with the book "Leaning to Six Sigma: The Path to the integration of Lean Enterprise and Six Sigma" (Wheat et al., 2001) and shortly after adopted by Michael George (2002). The LSS merger, Lean manufacturing concept, and Six Sigma

methodology have been widely known as continuous improvement methodology mainly by reducing costs and improving business performance overall (Antony et al., 2017).

To achieve improvements and address specific business problems LSS uses the most frequent DMAIC (Define-Measure-Analyze-Improve-Control) framework. In some cases, it uses DFLSS (Design for LSS) or DMADV (Define-Measure-Analyze-Design-Validate) (Albliwi et al., 2017). Each stage uses its own tools, but the most used tool was Cause and Effect diagram, Pareto Charts, Value Stream Mapping, Kaizen, SIPOC, VOC, etc. (Raval & Kant, 2017). Some authors argued that the number and the distribution of tools through the stages were inherent (Raval et al., 2018). For instance, Uluskan (2019) compared 68 LSS tools and suggested that the VOC is insufficient to find the problem. Both Lean (Toyota) and Six Sigma (Motorola) have the origin from manufacturing and have a very high degree of adoption. They have the same objectives for waste but use different techniques to reach the objectives. Irrespective of many successes, manufacturing version is still facing some problems caused by a lack of operational strategy (Sodhi et al., 2020).

LSS has wide adoption in services as well like financials, public, health care, or education. Again, despite many successes, LSS in services face challenges that have existed for quite some time (Juliani & De Oliveira, 2020). Some of LSS limitations presented in LSS applications in manufacturing and services were lack of clear picture on which tool to use in each DMAIC stage (Raja & Raju 2016), the drive for a quick win, sometimes avoiding VOC and the voice of employee (LeMahieu et al., 2017), lack of practitioners publication in academic journals (Raval & Kant, 2017) and lack of practical, user-friendly implementation road map (Antony, Sony, Dempsey, Brennan, Farrington & Cudeny, 2019). Furthermore, it was noted in the literature review that CSF and CFF do not differ too much among industries (Rodgers & Antony, 2019), and a lot of barriers have existed for many years in a row (Antony et al. 2020; Mishra et al. 2021).

Literature showed that link between the barriers and the strategies to overcome them is missing (Gaikwad et al., 2020). Although the application of LSS in services and manufacturing was evident, research shows that LSS application in financial services is limited and deserves attention (Ganesh & Marathe, 2019). Some of the motivation factors for implementing LSS in financial services were to increase operational efficiency and service quality, standardize and streamline the process, and enhance customer satisfaction (Singh & Rathi, 2019). However, LSS applications are known to

be challenging and more complex because services are quite different from the tangible end product in manufacturing (Madhani, 2020; Vashishth et al., 2019).

In this context, the review also revealed that the publications of LSS in financial services experienced declining last decade, calling for the substantial need for more publications (Sreedharan et al., 2020). Also, no articles were found about the integration of LSS with AI, Cloud computing, and Big Data (Patel & Patel, 2021), making the identification of barriers of LSS implementation in financial services a priority (Singh & Rathi, 2021). Research asserted that many authors were complaining for lack of empirical studies, tool kit and a road map for LSS implementations in financial services (Buavaraporn & Tannock, 2013; Lokkerbol et al. 2012; Mahmutaj et al. 2015; Snee, Wang & Chen, 2010; Wang & Hussain, 2011), while some manager didn't like the statistical methods of LSS leading to inadequate knowledge (Sreedharan et al., 2018) and lack of holistic thinking when trying to implement LSS (Antony 2019). However, many authors think that emerging trends of LSS integration with Big Data, Lean agile approach, and involvement of design thinking in LSS applications (Antony et al. 2020) could improve the success rate of LSS and bridge most of the barriers mentioned in the literature. The next chapter will review the literature of system thinking, specifically Soft System Methodology with core roots in soft system thinking philosophy.

Chapter 5: SSM, Importance of SSM in Management and LSS Research and Gaps of LSS Implementations in Financial Services.

5.1 Introduction

This chapter provides an overview of Soft System Methodology (SSM), its role in organization and management research followed by the importance of SSM studies in LSS literature. The researcher used Appendix I to precede the information about SSM with an extensive explanation of system thinking principles, where SSM roots come from (Checkland, 1981); a lot of auxiliary information about the background of system thinking theory, its role in management researches, a brief introduction to system thinking' classes such as hard, soft system thinking (Checkland, 1999) and critical system thinking (Jackson, 2000). Structural information about SSM Mode 1 and the shift towards SSM Mode 2 can be found in Appendix I as well. This chapter concludes with gaps identified in the literature of LSS implementation in financial services and the summary of all discussions as per theoretical lenses (Figure 1) defined for exploring the literature review.

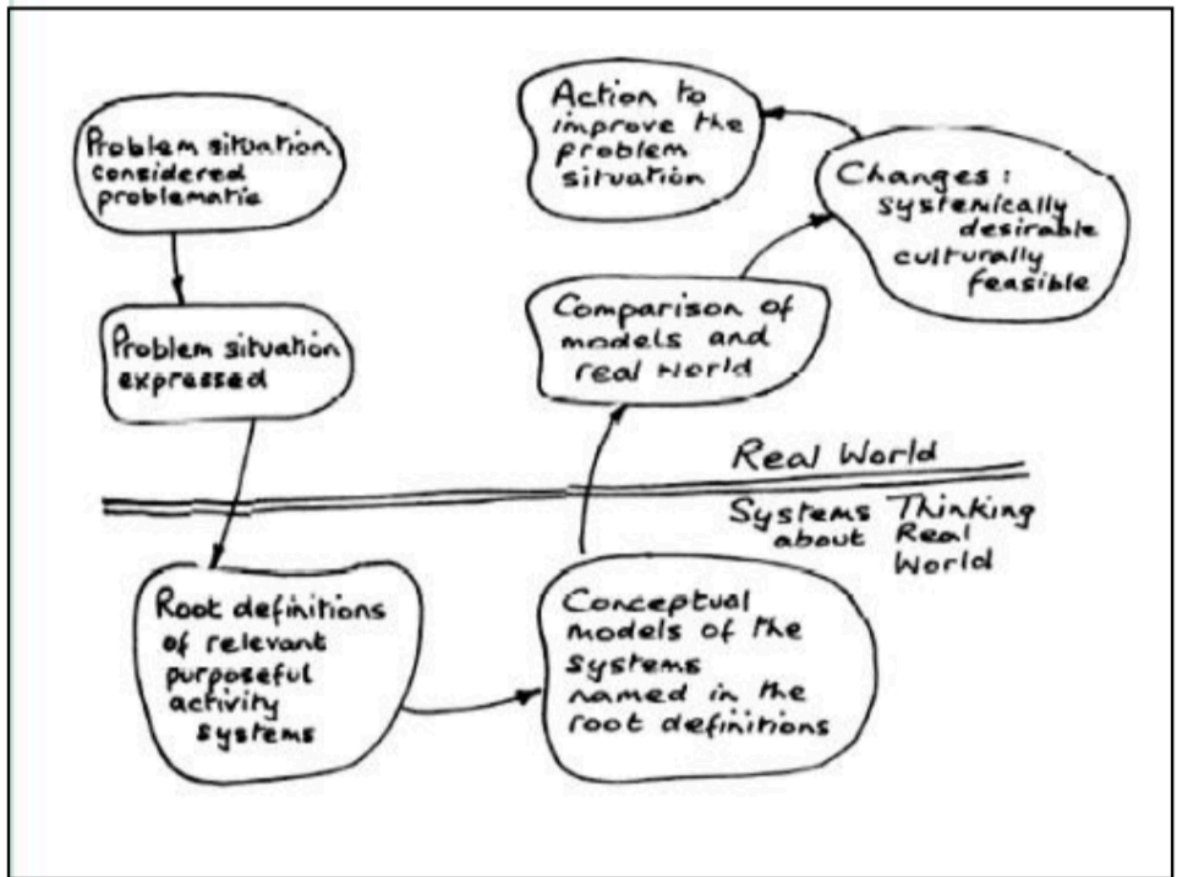
5.2 Overview of SSM

According to Reynolds and Holwell (2010), Soft System Methodology was originally developed by Peter Checkland in 1970, whereas the version, which is very much studied nowadays, as well, was published in 1981 (Mehregan et al., 2012). SSM is action-based research that uses models to structure the debate coming from various objectives, needs, interests, and perceptions from different people belonging to a problematic or ill-defined situation (Checkland, 1989). The fundamental assumption of Checkland is that any complex behavior is better understood if it is regarded as a whole rather than as one specific aspect of it. Paying attention more in whole rather than parts led Tajino, James, and Kijima (2005) to conclude that SSM is systemic rather than systematic.

In a theoretical context, system thinking is broad and sometimes not easily understood, and therefore, Peter Checkland developed the SSM to bridge this sort of gap between academia and practice (Checkland, 2000; Checkland & Scholes, 1990). The version presented by him in 1981 contains seven stages (Figure 12) used to structure the problematic situation in two main groups: real-world and thinking about the real world (Checkland, 2000). As a system-based approach, it facilitates both the participants and the researcher to consider and have a clearer understanding from different perspectives.

Figure 12

First SSM version published by Checkland in 1981



(Checkland and Scholes, 1990, p. 27)

Checkland and Holwell (1998) concluded that SSM tackles complexity and real-life problems through multiple perceptions of different stakeholders rather than one single view. Eriyatno (2013) describes SSM as a holistic approach for solving unstructured problems using system-thinking principles to understand the interactions between different stakeholders and translate them into the larger system specifying input-output and the transformation process. Purnomo (2012) highlighted that unlike other hard system thinking methodologies that include the process of thinking of the goal, result and target in advance, the emergence of SSM is linked with the assumption that the purpose of the system to be built is problematic. A uni-dimensional view of what the problem is will never come anywhere near to the complexity of the real world (Checkland & Poulter, 2006).

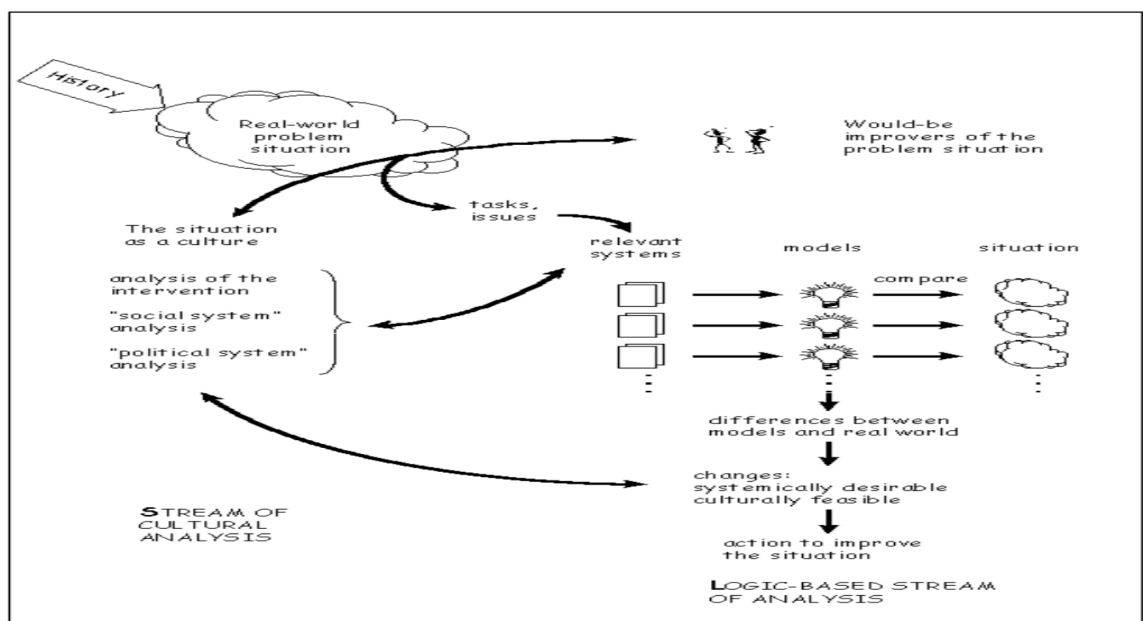
Despite many advantages in dealing with messy situations, SSM came along with some limitations. Lane and Olivia (1998) argued that imposing simultaneous changes cause conflicting results. Avison and Fitzgerald (2003) expressed their concerns that SSM lacks precise tools to ensure effectiveness. In this context, Yinghong (2007) highlighted

that the effectiveness of SSM is highly dependent on an individual's expertise and knowledge. Furthermore, the root definitions obtained from the process of expressing the situation were meaningful only under a special worldview, and the final recommendations were proposed based on those views (Hanafizadeh & Aliehyaei, 2011).

To better address issues related to human affairs, the external environment with the organization, and taking acceptable actions to improve the situation, by the end 1980s, Checkland came up with an improved version of SSM, as shown in Figure 13 (Checkland & Scholes, 1990). This version, alongside with already known logical stream (seven stages), has an additional characteristic that is related to cultural analysis or cultural stream (Checkland, 2000). He suggested that the first version was so linear, and the improved version of SSM Mode 2 goes beyond the problem-solving approach in converting the SSM in a proper inquiry process. That's the main reason that the researcher used the revised version of SSM to build as holistic as possible view of LSS applications in financial services. SSM Mode 2 facilitated the research to understand better the problems that occurred, and steps taken to deal with LSS interventions and have a clearer picture of norms, values, and issues that participants from different organizations faced. Checkland and Polter (2010) pointed out that SSM facilitates a strong grip between researchers and stakeholders to thoroughly understand the situation and, therefore, provide the right intervention steps.

Figure 13.

Second version of SSM



(Checkland & Scholes, 1990, p. 28)

According to Checkland (1990), the fundamental idea behind SSM is that the inquiry process for understanding the complexity of the 'real world' can be simulated as a learning process. That is why Mingers and White (2010) emphasize the importance of applying this methodology in dealing with social and human issues. It is a process that goes from finding out about the problematical situation to defining it and finally taking action to improve it. For Bunch (2003), SSM provides the basic theory to identify and define a problem and, at the same time, explores interrelationships of system components in a broader context. Hanafizadeh and Mehrabioun (2018) outlined that more than a tool, SSM, is considered an action-oriented methodology for dealing with complex social situations through multiple perspectives. It emphasizes structuring the thought about thinking in how to improve the situation and therefore provoking learning.

However, learning about social complex situations in an organization is not an easy task since and requires an adequate level of skills to correctly interpret people perceptions and models, which ultimately would affect the improvements. Hanafizadeh and Alihyaei (2011), in their study, considered special SSM knowledge or skills as a weakness for implementing SSM in different organizations. This was in opposite of Mingers and Taylor (1992) claims that SSM strength stands in practical deployment from people with a non-technical background. Anyway, they all suggest skills gap could be overcome going through many empirical studies.

SSM is a problem structuring approach in many areas of management research and project management (Checkland and Scholes, 1990; Checkland, 1999). But the fundamental questions that Barile, Pellicano, and Polese (2018) were seeking answers to were: What distinguishes a social system from a physical system? How to qualify the divergence in terms of representations between living and non-living systems? In the Appendix I the researcher provided different discussions that system thinking principles and the applications of SSM provide a framework for dealing with multiple perspectives and heterogeneity in a social system. Also in these discussions in the Appendix I, a lot of information can be found about SSM modes such as SSM Mode 1 and Mode 2 that helped the researcher to select SSM Mode 2 for evaluating the LSS implementations in financial services. As result it became clear for him that when it comes to investigating complex situations the application of SSM Mode 2 has more benefits rather than drawbacks. In the next section, more information will be provided for the role of SSM

in the organisation and management research, which will be followed with the importance of SSM in different LSS projects.

5.3 Role of SSM in Organization and Management Research

According to Checkland and Poulter (2006), the objective of SSM is to build and guide purposeful actions by articulating different perspectives in a problematic environment, whereas the objective of interpretative research is to understand a particular phenomenon from the participant's perspectives (Walsham, 2006). For Mingers (2001), the ontological assumptions in interpretative studies are based on social phenomena that do not physically exist and are rather experienced, making them highly subjective because of the reality. Therefore, people's perceptions about reality change over time. The underpinning assumption of interpretative epistemological stance is that experience brings knowledge, and therefore, the social world is constructed through human meanings (Jackson, 2001).

Since the first appearances of SSM, Checkland (1981) links the SSM with action research, where knowledge is created because of the evaluation of interventions in the problematic situation. Action research are mostly interpretative (Meyers, 1997) and socially critical. Checkland (1981, p. 283) drops the critically philosophical flavor of SSM since it is less political.

Salner (1999) argued with Checkland and Scholes, claiming there is a mismatch between their ontology and epistemology. Sometimes they are constructivist or sort of subjectivist, showing a lack of coherent philosophical stance of SSM. However, some years later, Holst and Nidhal (2001) concluded in their study that SSM is grounded in an interpretative approach. In SSM, the reality is socially constructed, and meanings are formed, transformed, used to reinforce the interpretation nature of the reality. Ulrich (2013) noted that SSM is an interpretative method and shouldn't be confused with the intervening approach.

Mahalepa and Goede (2017) claimed that SSM could be used to articulate and understand the data from qualitative interviews. When analyzing the interviewee's data, the researcher can link the answers directly to SSM components for developing rich pictures, root definitions, and activity models. Therefore, they strongly recommend using SSM for data collection and analysis in interpretative studies. In response to some critics about the difficulty of implementing SSM, Checkland, and Scholes argued back that SSM doesn't require high analysis experience "SSM can work with whatever 'intellectual input' is available!" (1990, p. 10).

SSM has found many applications in today's organizations; for instance, in software development, Taylor et al. (2001) used SSM to analyze business requirements and Wen and Rajadorai (2013) to analyze stakeholder requirements. In education, Nair (2015) facilitated SSM to prepare curricula, courses, and learning environments. In project management, Joham et al. (2009) applied SSM to prepare project conception, Doloi (2011) to estimate exact project costs, whereas Sankaran et al. 2009 used to monitor and control different project phases. Pentland et al. (2012) leveraged SSM to share knowledge. Irrespective the wide array of successful SSM implementations, Hanafizadeh and Mehrabioun (2018) pointed out that most practical examples are concerned with understanding the problematic situation rather than improving it. Instead SSM considers problems as messy human processes asking for constant negotiations of people involved to understand and structure the problematic situation (White, 2009). Ontologically speaking SSM identifies a real problem but treats it in an interpretative fashion using human activity system (HAS) perceived from people involved (Mingers, 2003). Such a strong ability of dealing with “*human issues*” was considered an opportunity by various authors (Antony et al., 2003; Chakravorty & Hales., 2013; Clegg & Orme., 2012; Tsironis et al., 2016) when it comes to the implementation of conventional methods like LSS that lack the ability on properly dealing with human factor. In this context more information about the importance of including SSM approach on tackling various issues specifically related with LSS methodology follows in coming section.

5.4 Importance of SSM in improving the methodology of LSS

As soon as Lean Six Sigma emerged as a blended methodology, Pojasek (2003) suggested the systems approach could be used to coordinate Lean and Six Sigma together. The immediate advantage of using system thinking principles (see Appendix I) to improve or evaluate LSS is to better understand human factor, that is, having the right organization culture where people culture and needs are understood and respected (Dahlgaard & Dahlgaard- Park, 2006). Antony et al. (2003) and Shah et al. (2008) acknowledge the fact that both Lean and Six Sigma are very well matured under quality management philosophy, but a holistic approach deriving from system science will improve the capability of embedding the philosophical and cultural they exhibit independently. Besides the application systems approach would help LSS to efficiently cope with business demands (Itkin, 2008).

Given the fact that LSS is known for its reductionist approach on dealing with organization problems, the openness towards other opportunities dealing with weaknesses inherited by this approach is recommended. According to Douglas et al. (2009, p. 190) this requires more holistic approach, which is perfectly provided by SSM. They have listed substantial benefits and saving for many organizations using LSS, but due to the reductionist approach they couldn't maximize their potential. For them, the DMAIC framework could benefit by using SSM tools such as Rich Pictures (see Appendix I) for a better identification of key people, processes and issues impacting project selection. Also the engagement of relevant stakeholders in problem solving and accommodating any cultural issues may reduce the resistance of change and improve the success rate of LSS.

Pepper and Spedding (2010) go even further by suggesting that LSS should come as “the all one approach” that optimizes as a whole and focuses in right strategies. They think that such approach should be situation oriented and balance between complexity and sustainability. Celgg (2007) suggested that SSM could be used for activities such as process improvement, strategy and change implementation that are all parts of LSS deployment. Wang and Chen (2012) used LSS in conjunction with SSM, which resulted in improvements of all supportive activities in their research. Whereas Dibia (2012) implemented SSM in triangulation with different qualitative (interviews) and quantitative (surveys) approaches for capturing a more holistic and contextual landscape in order to have a successful LSS implementation. However Clegg and Orme (2012) argue that producing a unified model of Lean management and Six Sigma, which optimize systems as a whole it is difficult and challengeable. On the other hand they warn that by not involving the principles of systems thinking LSS potential will go unrecognized and therefore the organization's performance will be diminished.

Wang and Chen (2012) applied the LSS approach and soft system methodology (SSM) to reduce variations of costs. More precisely they used LSS in the ‘define’, ‘measure’, ‘analyze’ and ‘control’ phases of the DMAIC approach, whereas the SSM was used to identify scopes for improvement in the ‘improve’ phase. They suggest further studies to leverage the benefits of combination of LSS with SSM. Despite optimism on using SSM for LSS implementations different scholars have identified some weaknesses on this cooperation. Clegg and Orme (2012) pointed out that the main criticism of SSM is

that is difficult to implement, it is highly qualitative and hard to produce measurable outcomes. Also modeling on the basis of different worldviews makes problem definition difficult, whereas sometimes the changes proposed are not systemic and thus (Lane & Oliva, 1998).

Anyway, in order to have a successful the combination of Lean and Six Sigma should be treated as one system that aims to have lean processes alongside with zero defects where everything has to be interconnected (Cervantes-Campoy & Hernandez-Luna, 2012). Then the interpretative approach of soft system thinking can be seen as supportive tool to solve organizational problems with an undefined structure, where the change is needed. They come up with a SSM conceptual model for efficiently combining Lean and Six Sigma to get the best out of them without reducing the overall performance of LSS implementations. Higgins (2013) listed a number of advantages on using soft system thinking principles together with LSS such as:

- Significant improvement in targeting LSS projects
- Improved alignment with leadership goals since blending systems thinking principles with continued improvement efforts with be system performs as whole rather than local.
- Up to four times better financial results that using LSS alone

On the other hand, Chakravorty and Hales (2013) suggest more researches on combination of LSS with SSM. They revealed that when the problem is clearly defined SSM worked perfectly, while when the problem wasn't clearly defined that the rate of improvement slowed down. Again more holistic studies are needed on finding our why the improvement programs fail. In particular more efforts are required to correctly identify improvement projects to better align them with the overall improvement objectives (Chakravorty & Hales, 2013). In the same wave length for more studies with them Orme et al. (2013) noted that LSS doesn't provide evidences towards soft system thinking approaches.

What is missing is a holistic framework, which integrates and interrelates the CSFs that can contribute to our understanding regarding the implementation of L6 σ . Since the majority of the above factors have emerged mainly in studies conducted in manufacturing industry, service industry seems to be a more complex and challenging business field for L6 σ application. However, what is missing is a holistic approach integrating CSFs contributing in better understanding LSS implementations. According

to Tsironis and Psychogios (2016) highly recommends the involvement of SSM in LSS implementations in services rather manufacturing since services are more complex. They suggested that neither Lean nor Six Sigma has a simplified means for determining continuous improvement and tracking it. They could very well track costs, but not performance. Moreover LSS clearly misses the selection of socially and acceptable solutions (Frajtová & Brožová, 2016). This gap is crucial to be addressed and they suggested extending the improvement phase of DMAIC with solution (S) since implementation is an essential for problem solving process. Other authors propose another approach for dealing with improvement phase of DMAIC. Mahato et al. (2017) utilized SSM to optimize the improvement stage of DMAIC and came up with DMAIoC version of LSS.

There significant efforts through the years on facilitating system thinking principles when dealing with LSS approaches, but still there is a plenty of work to address issues on leadership, innovation CSFs, barriers and gaps causing hesitation for services practitioners to implement LSS (Kumar et al., 2019). In the following section the researcher will summarize the gaps identified in LSS literature for financial services, in order to benchmark and utilize SSM features for addressing, narrowing or even closing those gaps.

5.5 Literature Review – Observations and Gaps

The review of literature brought forward a number of practical and academic gaps regarding LSS applications in manufacturing, services, and financial services. Some gaps were in the industry context, meaning manufacturing and service sectors, and the others, the subject matter specifically related to LSS application in the financial services.

All identified gaps in the context of challenges and limitations were linked with objectives and the rationale of the research. The first and the foremost gap is the lack of LSS empirical studies across all industries, including financial services (Sunder & Antony, 2015; Mahmutajet al., 2015; Buavaraporn and Tannock, 2013; Lokkerbol et al., 2012; Wang & Hussain, 2011; Snee, Wang & Chen, 2010).

The number of LSS publications has declined in the past ten years ago and continues to fall (Sreedharan, Pattusamy, Mohan, & Persis, 2020). Amongst publications that have seen the publishing light, 70% of published papers were by academicians. Only 12.4%

published articles were by practitioners and LSS professionals (Sreedharan & Raju, 2016). Later on, this gap was increased to 80% in favor of academicians (Patel and Patel, 2021). The literature review also revealed that most studies and publications are coming from the USA (25%), India (18%), while Europe is scoring very low (Panayiotou & Stergiou, 2020; Alblooshi et al., 2020). The first immediate contribution of the primary research is to bridge the disconnection gap of lack of empirical studies and the low number of practitioner's' publishing by providing new empirical LSS studies in financial services.

Some other gaps indicate there is no clear picture of which tool to use in different stages of LSS implementation (Raja & Raju, 2016; Mishra et al., 2021).

The implementation/ improvement phase of DMAIC burns a lot of time, undermining leading some organizations to hesitate to select LSS as a methodology (Sreedharan et al., 2018).

The research will shed light on these two gaps as well.

The previous section provided valuable information about the importance of using SSM to improve LSS implementations in different industries. No traces about any publications of SSM evaluations or improvements in LSS in financial services were found. Following the gaps of LSS in financial services there is large and rare opportunity for using SSM to tackle them. Besides when it comes to services and financial services there were large research gaps in understanding LSS from a system thinking perspective (Ganesh & Marathe, 2018). LSS has no tools to deal with soft aspects of the organization (Alblooshi et al., 2020), reinforcing the fact that using soft system thinking principles of SSM for evaluating LSS implementation in financial services it was the right decision with huge expected contributions for academia and practice.

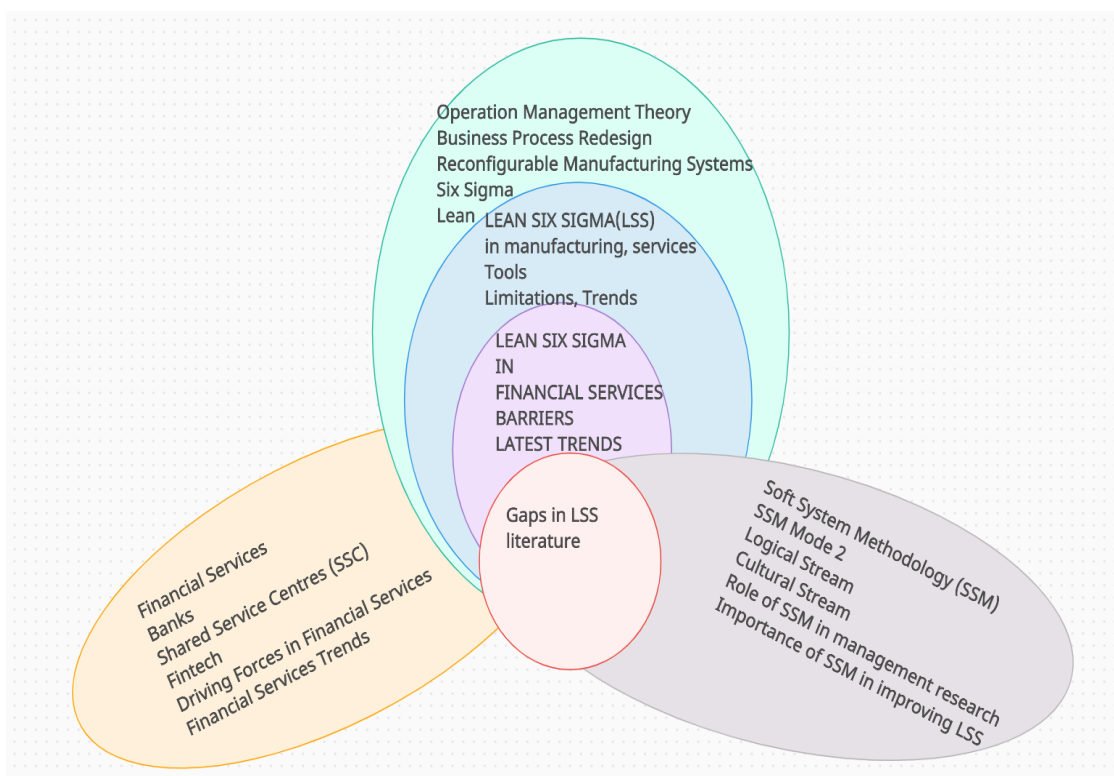
5.6 Chapter Summary. Literature Review Summary and Conclusions

The aim of this chapter was to provide an overview of SSM, synthesise its role in management research by specifically focusing the SSM importance in LSS studies. Many authors have discussed through the years the benefits of incorporating SSM in LSS implementations. However studies that link SSM with financial services were missing. Gaps identified in LSS literature for financial services domain confirm this reinforcing again that the researcher's decision to use SSM for evaluating LSS in financial services was the right decision.

LSS is an attractive field of interest both in academia and practice. By applying contextual and theoretical lenses as shown in theoretical framework the research contributes in knowledge and practice. Contextual lenses of financial services, SSM, OM theory methodologies and LSS in manufacturing and service sectors opened the doors of theoretical lenses which helped the researcher to narrow down the area of study towards the main thesis objectives and adding another lens of gaps identified in literature (Figure 15). Auxiliary theoretical lenses of financial services and SSM provided a clearer picture of the entire research. Challenges, Limitations and gaps derived from literature review of LSS will help scholars and practitioners to deal and how to addresses or promote LSS in future.

Figure 15

Theoretical Journey and Contextual Research Lenses adopted in the study including gaps identified in the LSS literature



(Islamaj, 2021)

Previous section listed some of the gaps identified in literature review, where the following Table 4 maps the research objectives against the key findings from the literature review that were taken forward to the finding and analysis chapter. The next

chapter is the methodology chapter where the researcher will explain the philosophical stance of the method selected alongside with explanations of why other methods weren't chosen. Also, it provides extensive information about data collection, validation, analysis and ethical considerations.

Table 4

Thesis Mapping (Stage 2) Key findings from the literature review chapters

Thesis Research Mapping (Stage 2) Key findings from Chapters 3, 4 & 5 – Literature Review	
Research Question	Key Findings Contributions
What are the main challenges of Lean Six Sigma	1. LSS limitations in manufacturing, services and financial services extensively discussed in Chapter 4 –Literature Review.
How Lean Six Sigma has been deployed and implemented in financial services?	See Chapter 7 for empirical research findings.
What are the barriers/ gaps that make Lean Six Sigma implementations in financial services less effective than manufacturing?	1-) Latest developments in financial services explored in Chapter 3. 2-) Barriers in Lean Six Sigma in financial service are critically reviewed in Chapter 4- Literature review. 3-) Empirical findings could be retrieved and summarized from chapter 7.

(Islamaj, 2021)

Chapter 6: Methodology

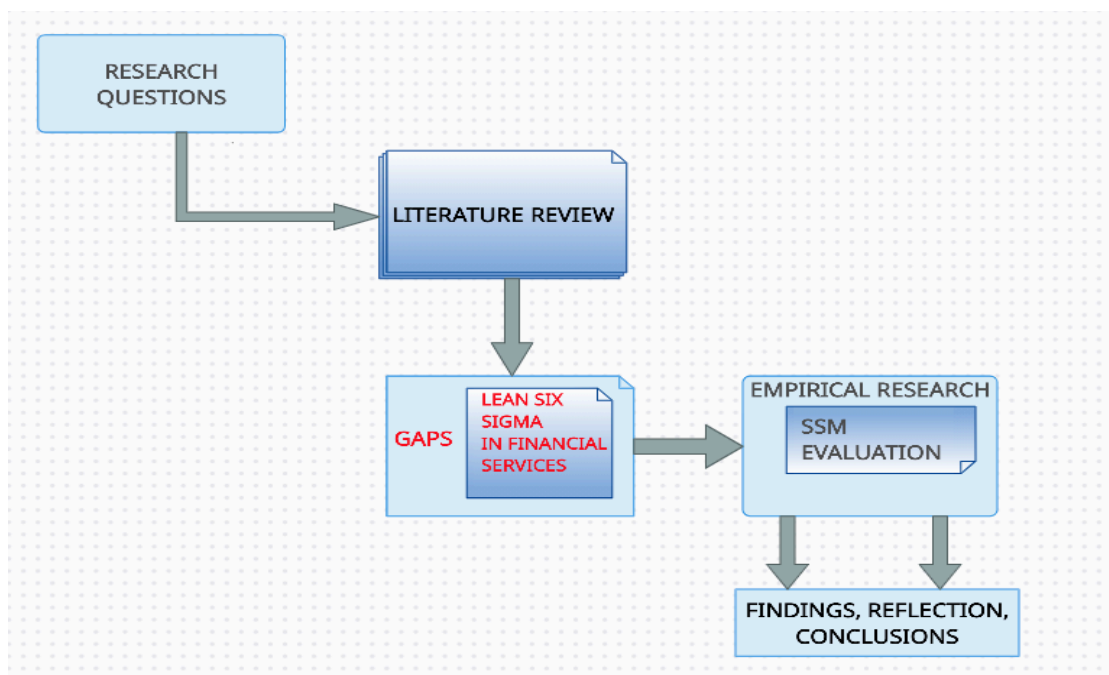
6.1 Introduction

Research design (Figure 16) can be defined as: "... an action plan for getting from here to there, where here may be defined as the initial set of questions to be answered, and there is some set of conclusions (answers) about these questions" (Yin, 2003, p.19). The design stage starts by highlighting the research questions, aim, and objectives, followed by a literature review, which was concluded with LSS gaps in the domain of financial services.

This chapter aims to describe and explain the ontological and epistemological approaches that were taken in regard to the research methodology for addressing the research questions. It establishes the rules of conducting empirical research by detailing the data collections process and ethical considerations. Also, it revisits the research aim and objectives in the next section, explains the philosophical background of SSM as the methodology chosen for the evaluation, research technics about sampling, data collection, and analysis.

Figure 16

Research Design



(Islamaj, 2021)

The literature review (Chapters 3,4,5 and 6) has explored the role of LSS in manufacturing, services, and in particular in financial services. Many scholars have brought forward several issues related to LSS in various organizations and emphasized the importance of dealing with challenges that LSS is facing. Therefore, to understand the literature findings more explicitly, the research extended its explorations with four empirical studies (Chapter 8) in financial services. The goal was to evaluate LSS implementations from day-to-day practitioners in financial services seeking answers to questions that concern both financial services and LSS itself. The events happening in the current research have a geographical stretch from Europe to Asia. People chosen for the study were those who and participated in LSS projects in their organizations and were best qualified to answer the research questions

6.2 Background to Research Questions

Following the number of gaps identified in the literature for LSS in financial services and manufacturing and services in general, the first question that emerged to the researcher was that 'What is going on with LSS applications in financial services?'

The best way to answer this very general question, but with concerning context, is to start the evaluation by understanding "How has LSS deployed in financial services?", "What triggers to start?". Who are the main people involved", What are the main tools that are usually used?" How are they used?" What are the main challenges?" Is there any way to overcome those challenges, and if yes, how?"

Hence to answer the main research question, the researcher started evaluating the situation by initially exploring the ontological and epistemological of his research.

6.3 Ontological and Epistemological assumptions

In this section, the researcher will discuss the epistemological and ontological assumptions used throughout the research that helped him to follow the most appropriate research methodology. In philosophy, ontology is the study of being and covers what we believe can exist or be fundamental exists (Guba and Lincoln, 1982). It provides various criteria for distinguishing among different types of objects and their dependencies.

According to Strauss and Corbin, 1990), ontology is used to reason about the objects within that domain and share an understanding of some domains of interest, often conceived as classes, relations, functions, axioms, and instances (Perry, 1995). The product of such study is called ontology and provides a catalog of the types of things assumed to exist in a domain of interest (Strauss and Corbin, 1998). In the most basic sense, ontology describes what can be known (Crotty, 1998). Anyway, the most cited definition of ontology comes from Paul and Elder (1997, p34): "ontology is a formal, explicit specification of a shared conceptualization. Polgar and Thomas (2005) tried to elaborate in detail on this definition. They suggested that 'Conceptualization' refers to an abstract model of phenomena in the world by having identified the relevant concepts of those phenomena. At the same time, 'Explicit' means that the type of concepts the constraints used are explicitly defined. In addition, 'Formal' refers to the fact that the ontology should be machine-readable, and 'Shared' reflects that ontology should capture consensual knowledge accepted by the communities.

On the other hand, epistemology raises many questions such as "how we can know the reality?" or "what is the relationship between the knower and what is known?" (Charmaz, 2006). An epistemological perspective provides a framework for predicting, describing, empowering, and deconstructing population-specific worldviews, which could lead to improved understanding of the purpose behind qualitative research as well (Merriam, 2009), and it is used to describe ways of knowing, how we know what we know, and who can be a knower (Sprague, 2010). McAuley, Duberley, and Johnson (2014) suggested that epistemology studies the theory of knowledge by questioning what knowledge is and how it is acquired.

Major types of epistemologies are objectivism and subjectivism (Crotty, 1998). Objectivism means that meaning and meaningful reality exist, and it represents "the position that social entities exist in reality external to social actors" (Saunders et al., 2009: p.110). Alternatively, in subjectivism, the perceptions give an understanding without any testing, and that truth is determined and obtained through experience (Charmaz, 1995). It refers to the meaning coming from anything but the object to which it is ascribed, which means the object itself does not contribute to the meaning that is imposed by the subject (Crotty, 1998). Like epistemology, there are groups of objectivists and subjectivists in the ontology as well. The objectivist ontology or positivist approach believes that the world is external (Carson et al., 1988). There is a

single objective reality regardless of the researcher's worldview (Hudson and Ozanne, 1988).

Interpretivist approaches known as ontologically subjective believe that reality is relative and multiple (Hudson and Ozzane, 1998). Lincoln and Guba (1985) argue that multiple realities depend on other systems' meanings, making it even more difficult to interpret in fixed realities (Neuman, 2000). In this case, the knowledge acquired is socially constructed rather than objectively determined (Carson et al., 2001, p.5). Hence, interpretivism aims to understand and interpret meanings, motives, reasons, and other subjective experiences that are time and context related (Neuman, 2000; Hudson and Ozanne, 1988).

The goal of current research is to understand "what is going on" with LSS applications in financial services by exploring all participants' views and establish a shared meaning and concepts in the context of financial services. The research reviewed various types of financial services like banks, shared service centers, and fintech and involved as many stakeholders as possible from a wide array of roles and activities to ensure the presence of as large as possible. Ontologically speaking, the current study sat within the subjectivist ontology paradigm. Thus, the researcher chose to apply an interpretative research approach to his study.

Littlejohn (2016) distinguishes the two major research methodologies: quantitative methodology grounded on the positivist paradigm and qualitative methodology grounded on the interpretivism quadrant. A researcher with a positivist orientation regards the reality as being 'out there and uses conventional scientific methodologies (Bassey, 1995) with quantitative methods to discover the world (Cohen, Manion & Morrison, 2000). Under this guidance, they sometimes feel like not important variables in the research and believe they are detached from their study (Mutch, 2005).

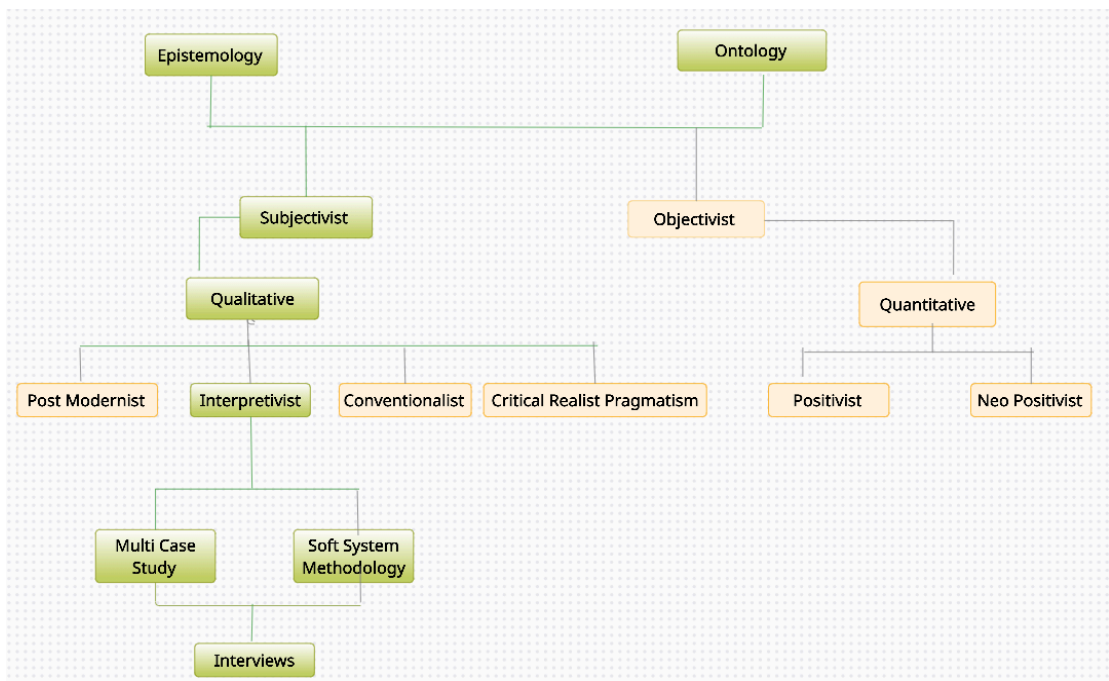
In contrast, a qualitative category, where the researcher will discuss in more detail in section 7.5, Merriam (2009) identified four primary epistemological perspectives: postmodernist, interpretive, conventionalist, and critical. Holloway (1997) has attributed the interpretivism where the qualitative methodology is grounded into Max Weber with his widely known concept of "verstehen," meaning "understanding" something in its context. He argued that Weber opposed the application of the positivist approach to the social sciences since people's actions are highly complex and dependent on their

emotions and rationales and not related to general laws. Early authors like Tucker (1965, p.157), referring to the Weber' verstehen concept, mentioned that action is" only social if, and then only in so far as, it takes account of someone else's behavior." People create and associate their subjective meanings while interacting with the world around them (Orlikowski and Baroudi, 1991).

Therefore, all social researches are inherently biased, Weber argues, and objectivity is impossible to be achieved since the values of the researcher and participants are always present (Holloway, 1997). Figure 17 shows the philosophical approach developed by the researcher to support the research aims and objectives alongside respective justifications from literature and the need to follow an inductive approach.

Figure 17.

Research Philosophical Approach



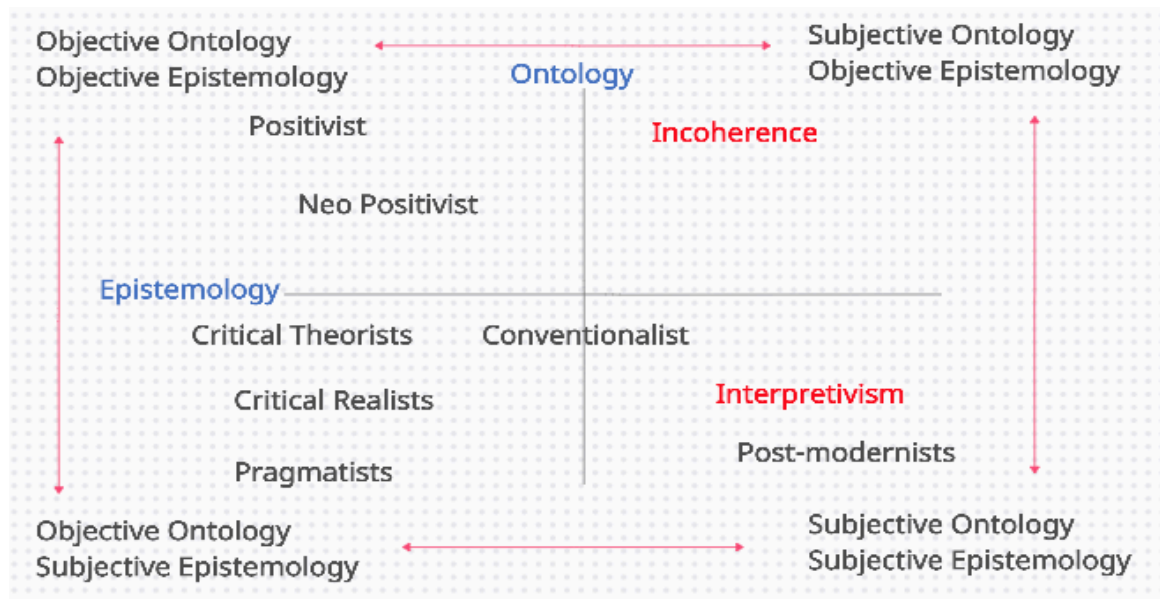
(Islamaj, 2021)

Ontological and epistemological philosophies underpin the subjectivist paradigm. Therefore, the researcher followed the green route, which was a great help to gain a deep and thorough understanding of all participant views and experiences during LSS implementations in their organizations.

In Figure 18, the researcher presented the matrix of main ontological and epistemological positions for each research paradigms (Johnson and Duberley, 2012, p.180). The reason for this is not only to precisely pinpoint the philosophical grounds of the approach chosen for the research but also to explain the rationale of selecting the current approach over the other research methodologies. In fact, much of the interpretive research conducted by social scientists is normative and seeks to develop consensus (Alvesson and Deetz, 2000). In this sense, Cumming (2012) noted a clear sense of contrast between positivism and qualitative interpretations inherent in the interpretive paradigm, as shown in the matrix. Johnson and Duberley (2012) noted interpretivism has a strong subjectivism approach; therefore, the interpretive approach selected from the researcher falls in subjective ontology and epistemology.

Figure 18.

Research Paradigm Matrix.



(Johnson & Duberley, 2012, p.180)

The ontological approach moves in the top left corner from the objectivist to the subjectivist position in the right corner on the X-axis. While on Y-Axis, the epistemological approach moves from the objectivist top left corner to the subjectivist in the right-hand corner at the bottom.

Interpretivism sits in subjective ontology and epistemology, facing directly on the opposite side of the positivism methodology. Using objective ontology and

epistemology of the positivism approach was considered irrelevant because open questions applied in the semi-structured interviews in the research provided adequate openness for the participants to freely express their views about LSS implementations. The top right corner is considered incoherent since no research methodology sits over there. In philosophy and psychology, subjectivity has usually been used in contradistinction to the concept of objectivity. Mascolo and Kallio (2020) stated that while objectivity is typically tied to the seeming certainty of publicly observable events, subjectivity tends to be identified with its contrast--to unverified personal feelings and beliefs.

That is why the researcher selected subjectivism as he wanted to understand participant beliefs and views to find out what is going on during LSS implementations in financial services. Choosing objectivism would have ended up informal interviews, risking not meeting the research aims and objectives. Besides, as noted in the literature review, most studies in LSS were compiled using quantitative methodologies, and most of the limitations identified were present for decades. Positivists usually employ a more generalist approach in their studies, which was not appropriate for the current research aiming to tackle the issues revealed in the literature review. In support of this theory, Johnson and Duberley (2012) noted that positivists tended to use the generalist approach in their studies, while interpretivists took a more particular approach and studied the phenomena linked to their goals. Ibrahim (2014) argues that interpretivism employs qualitative methods to understand people, not to measure them.

In contrast, the quantitative results from a positivist method like a survey are unlikely to provide an understanding of this deeper reality. They, therefore, should not be a major part of any realism research project, he continued. Thus, the researcher sensed there was a real need that was back up with several gaps in the literature as well for exploring LSS applications using qualitative methods of interpretative approach, e.g., system thinking approach in current research.

While positivists tend to avoid the complexities that organizations face and consider it rather simple, systems thinking provides a holistic approach that focuses on how a system's elements interact and how systems work overtime and within the context of larger systems (Checkland and Scholes, 1990). It contrasts with traditional approaches that break the system into elements to study them (Lutkevich, 2021). Also, using interpretive descriptions, the researcher can address complex questions while producing

practical outcomes (Thompson Burdine et al., 2021). In this paragraph, the researcher justified the rationale of interpretivism as a preferable choice for the research. The positivism approach positioned in a direct opposite side of interpretivism (McAuley, Johnson and Duberley, 2014) wasn't considered for reasons that became obvious. In the next sub section the ontological and epistemological background of the research methodology will be explored and benchmarked with current philosophical stance of the research.

6.3.1 Philosophical Background of SSM

Originally the ontological position of SSM has been linked to phenomenology (Checkland, 1981). He supported the notion of phenomenology in its concern of thinking about the world but explicitly related SSM to interpretive social science: "And at a more detailed level, too, there are many parallels between the operations within the methodology and the philosophical/sociological tradition of interpretive social science." (Checkland, 1981, p. 279). Hence the researcher reckons there aren't ontological conflicts between SSM and the interpretative approach. In line with explanation of philosophical perspective of SSM, Mingers (1984) stated that The SSM is contrasted with positivism, which makes both ontological and epistemological claims:

"The model of social reality implicit in the methodology...is that social reality, the reality of 'individuals', 'groups', 'organizations', 'roles', etc. is not given, like fire engines, frogs and foxgloves, but is continuously constructed and reconstructed by communication between individuals. (Mingers, 1984, p.29)

Furthermore, Checkland and Scholes (1990) claimed that SSM should be considered as an epistemology rather than ontology:

"The essence of soft systems thinking ... [is] that it provides a coherent intellectual framework ... as an epistemology which can be used to try to understand and intervene usefully in the rich and surprising flux of everyday situations" (Checkland and Scholes 1990, p. 24).

The general agreement is that SSM embodies the philosophical assumptions of some subjectivism Probert (1998) argued. In fact, SSM is 'a rigorous approach to the subjective' (Checkland, 1999, p. A43). Attwater (1999) stated that SSM is an inquiry-based method that builds upon different perceptions of problematic aspects to describe several conceptual activity models. He suggests that these conceptual models, based on

different worldviews, are used to help structure a dialogue to define desirable organizational changes. Therefore, the interpretive approach of SSM acknowledges the fact that systems are better understood through subjective views and meanings of those involved (Jackson, 2000), emphasizing that social reality is constructed and reconstructed through conversations and actions, as opposed to a pure static outlook that neglects worldviews (Checkland, 2000).

According to Jackson (2003), SSM is a qualitative research methodology based on systems thinking theory, and which places importance on meaning, self-reflexivity, interpretation, human experience, learning, and participation (Jackson, 2003). It will try to learn about a complex situation faced during the LSS implementations so that action can then be taken to improve the situation under investigation (Checkland and Poulter, 2010). The learning process is underpinned by identifying and considering all stakeholders' viewpoints on how they want to act or intervene purposefully to promote desirable and appropriate change to a system (Checkland, 1999; Checkland and Scholes, 1999; Checkland and Poulter, 2006). Hence, the SSM is a qualitative and participatory inquiry process where the expected outcome action improves via learning (Checkland and Poulter, 2010). During the learning cycle, the researcher will structure the analysis and debates to find an adequate consensus among the participants. The main idea behind SSM is to use system or holons thinking to construct some models that represent the situation under evaluation, interpret these models and use these models to guide the debate about the situation while learning in each stage and propose the desirable changes (Huaxia, 2010).

She pointed out that SSM is interpretative mainly because its critical step is to interpret the social regulations, cultural backgrounds, and *Weltanschauung* (worldview) influencing human behaviors to understand the problem situation and various models. To sum it up, the ontologically soft system is not assumed to exist in the real world. They are just concepts used to describe a social structural procedure, while epistemologically, they are interpretative, anti-positivist and the process of describing the world is activity-based (Dibia, 2012). The main assumption of SSM is that reality is complex and is socially constructed. It is a product of continuous interactions, whereas epistemology is the intervention to understand reality through the interpretative process (Pauca-Caceres and Jerardino-Wiesenborn, 2020).

The bottom-line philosophy of SSM is to provide a facilitative method for organization investigation, where the investigator doesn't model the "system" in isolation but facilitates the organizational actors to model their organization system (Gasson, 2021). In

the next section, the researcher reviewed and explained why the other research paradigms in the Johnson and Duberley (2012, p.180) matrix were also rejected.

6.4 Paradigms not appropriate for the Research

According to Taylor (2018), social constructionism and social constructivist are two different things. Virtually all those who identify themselves as social constructionists favor using the term "constructionism" rather than "constructivism," but they are two different things in reality.

For Gergen (1995), this distinction reflected the social constructionist's opposition to the isolated knower and criticized the constructivist approach for having human beings imprisoned in their individualist experience. Whilst the knowledge emerges as an outcome of interactions between people the environment (Schunk, 2012). By contrast, social constructionists emphasize the "primacy of relational, conversational, social practices as the source of individual psychic life" (Stam, 1998, p. 199). Raskin (2002) noted that social constructionists believe that reality is socially negotiated. To some extent, they have something in common with interpretivism, whose focus is on the process by which meanings are created, negotiated, sustained, and modified (Schwandt, 2003). Social constructionism has a more social focus rather than a human one rather than an individual focus (Young and Colin, 2004).

According to Taylor (2018), social constructionism focuses on things that are created through social interactions, where knowledge is created and transmitted in a social context. The truth is constructed by social processes that are historically and culturally specific. The current research is not self-reflexive but doesn't dispute it. The researcher is open to the participants' reflection of, participants, e.g., what could have been done differently".

The aim of the research is to explore and know more if not as much as possible on what is happening in LSS applications. The research aims have nothing to do with cultural and historical context, as social constructionism suggests. For instance, the events analyzed in the current research took place in Europe and Asia and there was no intention to divert the investigation to cultural grounds. Researcher is aware about the importance of culture, which could impact LSS implementations, but he preferred to stay cultural neutral in his study. Therefore, the researcher decided not to move with social constructionism on the ground of cultural free position.

Conventionalism sits between objective and subjective ontology quadrants and resonates with strong subjective epistemology (Fiss, 1995). He suggested that conventionalism represents a viewpoint emphasizing practice over context. It holds, for example, that we understand a concept not when we grasp some facts but when we can successfully use that concept within a defined context. The truth is a function of the agreement among participants rather than another way round. There is nothing there for them. Even if it was there, we couldn't know it, he added. One of the problems of conventionalism identified since the early years by Black (1936) was the contingency problem, who pointed out that if a particular proposition is based on a convention, then the proposition should be contingent rather than necessary. Sidelle (2009) expressed this problem using metaphysical metaphor...if metaphysics is explained by virtue of conventions, then what is explained is not really a necessity. Hence the conventionalist will need some fairly strong arguments to undermine reality. As Varzi (2011) admits: 'Surely the intuitive plausibility [of the conventionalist stance] is low, and perhaps also its scientific tenability (Varzi, 2011 p. 148). The conventionalism arguments to undermine the plausibility of realism are inadequate (Tahko, 2012), and despite its opposites the positivism, their results are relative (Johnson and Duberley, 2012). The research requires data that reflects what happens in LSS implementations hence rejects this paradigm.

Post-modernism also sits very close to interpretivism with strong subjective epistemology and ontology but relies on relativism; therefore, it will be rejected too. Larry (2007) noted that post-modernism's major problems are the affirmation of self-reflexiveness and relativism as an attempt to have meaning without transcendent value and action without absolute truth. Postmodernism is best understood as questioning or challenging the modernism ideas and values that believe in intervention or progress and innovation (Palmer, 2014).

In the current research, innovation, interventions, and suggestions for the future are part of the thesis objectives and represent one of the most important activities of the methodology chosen. Hence post-modernism route is rejected by the researcher.

Critical theory, which opposes positivism as interpretivism does, was considered inappropriate for the research since it focuses mainly upon the connection between politics, values, and knowledge. According to Alvesson and Willmott (1998), critical theory provokes deeper consideration of the politics and values, which underpin and

legitimize the authority of scientific knowledge (Alvesson and Willmott, 1988). Weighing too much on politics values critical theory found the researcher unprepared to follow this lead, as the outcome could raise ethical issues, upset the organizations under investigation, or derail the real output of the research. The financial services landscape is rapidly changing with new players emerging. In contrast, the existing ones facing dramatic digital transformation and getting themselves caught in political consideration would haven't been helpful for the researcher. Bhaskar (1997) noted that critical philosophy considers concepts and meanings as objectives in the real world. Critical theory refuses to identify freedom with any institutional arrangement or fixed system of thought Bronner (, 2017). Hence, the researcher focused on tackling problematic situations by promoting the participants to speak freely about this particular area of the research.

Therefore, to not distort participant views, the researcher decided not to pursue the critical theory approach due to concerns of producing undeniably dangerous knowledge (Kincheloe and McLaren, 1998:260) by heavily relying on political interests and values (Alvesson et al. 2009). According to Reed (2001), critical realists argue for a shift from prediction to explanation, the use of abstraction, and reliance on interpretive forms of investigation. Critical realism is very close to interpretivism and could have been a choice from the researcher if it recognizes the reality by assuming that there is a real-world out there (Easton, 2010). Although these assumptions can be approved or disapproved, Reed (2001) thinks that those are not insurmountable if one does not search for timeless and universal explanatory.

Anyway, they were both rejected by the researcher because when studying human information actions in context, they categorically distinguish human action and their socio-cultural structure (Wikgren, 2005). They continually ask the emancipation of participants in the Research (Yeung, 1997) and challenge who the correct people were approached for the research since the properties possessed by social forms may be different from those owned by individuals, he added. Some scholars describe critical realism as providing researchers with an approach to sit on the fence' when interpreting research data to maintain the illusion of objective reality (Elder-Vass D, 2012). The researcher invited a wide range of participants, but more importantly, it was mandatory that all the participants should have been part of LSS projects in their organizations. The selection of participants was not random, explained, and approved by the organization's

high management under investigation. Of course, that many participants are better. The current research was confined to the specific area of the field, whereas extending the range of participants as pragmatism and critical realist suggest could have been unmanageable. Still, above all, it wouldn't have an additional impact in terms of outcome. The following section will discuss qualitative research methods and explain their rationale over the quantitative approach in the current research.

6.5 Qualitative approach

Having identified and clarified the ontological and epistemological stances of the research, explaining the research approaches just flowed naturally.

For Flanagan (2013), the scientific method is still the most powerful tool for discovering the truth, exploring new theories, or performing empirical validation. Hence, scientific research can be summarized as the process of systematic and intensive inquiring, interpreting the facts, and discovering the reality that the data collected hold.

Many scholars have argued that there are no better or worse research methodologies as they have proven to be useful, but instead different ways of looking at the world, different ways to observe, measure and understand social reality (Neuman, 2003; Cohen et al. 2000; Silverman, 1997). What matters is the selection of the appropriate research methodology, which requires several considerations (Creswell, 2003). For instance, the sample size, participant availabilities to take part in the study (Flick, 2009), the researcher's own experiences in the subject matter and the audience to whom the research is addressed, and the audience to whom the research is to address to (Tuli, 2010). When it comes to analyzing the data, scientific research is categorized as quantitative or qualitative. Quantitative research relies on the use of numbers and accuracy to develop a hypothesis of the anticipated result or expected outcome from the question being researched (Polit and Beck, 2012).

Qualitative research focuses on lived experiences, deals with the universe of meanings, motives, aspirations, beliefs, values, and attitudes, which corresponds to processes and phenomena that cannot be reduced to the operationalization of variables (Maxwell, 2013). Disciplines such as mathematics and statistics are generally employed in data analysis and generalization of the results obtained. Quantitative approaches have been quite successful in scientific research and continue to perform so; however, some scholars argue about the limitations of this approach in various areas of research.

Denzin & Lincoln (1998) highlighted that the background of quantitative approaches is objectivism and positivism and fail to ascertain deeper underlying meanings and explanations. Martin and Bridgmon (2012) suggest that data needs to be quantified in quantitative research because the samples are usually large, and the results are taken as if they constituted a general and sufficiently comprehensive view of the entire population. Payne and Payne (2004) defined that:

"Quantitative methods seek regularities in human lives, by separating the social world into empirical components called variables which can be represented numerically as frequencies or rate, whose associations with each other can be explored by statistical techniques and accessed through researcher-introduced stimuli and systematic measurement." Payne and Payne (2004, p. 180)

Weber (2004) has expressed his concern that in positivism, person and reality are separated, objective truth exists beyond the human mind, and the research object is associated with qualities independent of the researchers. Blaikie (2007) argues that positivism cannot account for how the social reality is shaped and maintained or how people interpret their actions and others. Its tendency is merely taking a snapshot of a phenomenon and measuring variables at a specific moment in time, focusing only on the high-level picture of the situation (Schofield, 2007). Quantitative research strategies have long been treated as an opposing paradigm of qualitative research (Creswell, 2015) (See Table 5).

Table 5:

Differences between Quantitative and Qualitative Research Methodologies.

Dimension	Quantitative research	Qualitative research
Focus on understanding the context of the problem	Smaller	Bigger
Dimension of group studies	Smaller	Bigger
Proximity of the researcher to the problem being studied	Smaller	Bigger
Scope of the study in time	Immediate	Longer range
Researcher's point of view	External	Internal
Theoretical framework and hypotheses	Well structured	Less structured
Flexibility and exploratory analysis	Lower	Higher

(Queiróset al., 2017)

In positivism, knowledge is obtained through empirical testing with attempts to measure the social phenomena, while in qualitative researches, knowledge comes from the

meaning of social events, and only a clear understanding of philosophical stance will guide the researcher to carry on with their own studies (Littlejohn, 2016; Richardson, 2012). The quantitative research approach overlooks the respondents' experiences and perspectives in highly controlled settings because the direct connection between researchers and the participants when collecting data is missing (Ary et al., 2013). That's why the data collection method is called objective. Therefore, the right choice of a suitable research methodology is crucial to perform effective scientific research and is mainly based on linking research objectives to the characteristics of the available research methodologies (Basias and Pollalis, 2018).

The current research was not seeking any generalization. Still, it aimed to bring closer to the reader LSS theory and day-to-day practice to grasp the participant's beliefs about the truth. It was argued that quantitative research leaves out the meaning and the effect of a particular system since the approach is not concerned with the detailed picture of variables (Rahman, 2020). Hence the quantitative approach was considered irrelevant for the research since the qualitative method was deemed closer and most appropriate route to meet the aim and objectives of the research. Qualitative approaches differ considerably in how they collect and analyze data (Miles et al., 2014). For instance, Strauss and Corbin (1990, p. 11) noted that:

"By the term' qualitative research, we mean any research that produces findings not arrived at by statistical procedures or other means of quantification. It can refer to research about persons' lives, lived experiences, behaviors, emotions, and feelings as well as about organizational functioning, social movements, cultural phenomena, and interactions between nations."

This means that qualitative research is not statistical. It incorporates multiple realities; therefore, in the current research, the qualitative approach was used to understand the reality of LSS applications in financial services. "Qualitative research interested in analyzing subjective meaning or the social production of issues, events, or practices by collecting non-standardized data and analyzing texts and images rather than number and statistics" (Flick, 2014a, p. 542).

The research led towards an interpretative approach, and in order to make sense of the participant's world, the researcher applied Soft System Methodology (SSM) in a multi-case study approach. There were four case studies with geographical distribution from

Europe and Asia in a very diverse environment with participants from banks, financial shared service centers, and fintech.

Qualitative studies perfectly address the social aspect of research by employing open-ended questions in a semi-structured interview fashion (Choy, 2014). Typically, a rich narrative from participant interviews is generated and then qualitatively analyzed to uncover the problem and address it comprehensively (Polit and Beck, 2014). Flick (2014b) stated that the predominant type of analysis in qualitative research consists of category formation. He suggested that by constructing descriptive systems for empirical phenomena, it is possible to analyze the underlying empirical structure at a higher level of abstraction. Indeed, this process is essential in many qualitative methodologies, e.g., qualitative content analysis, thematic analysis, where these features are results of an interpretative process (Scheunpflug et al., 2016). It follows that many gaps about LSS identified in the literature exist for decades, remained unaddressed...reinforcing to a great extent the researcher's choice to follow the lead of qualitative approach. An example of benefits in using the data quality approach by enabling open and free discussions with the participants was the concern about the "improvement" stage in the DMAIC framework of LSS methodology. Some authors (Antony et al., 2019) pointed out that LSS burns too much energy during the implementation phase. Participants identified and mentioned this issue during the interviews and made some suggestions for future improvements:

"Yes, during the Implementation phase, we cannot wait to complete all the improvements or tasks of the action plans in order to go live, but we can go live for example by Sprints as it is Agile methodology ... we've identified small changes that could be implemented directly and not to wait to go with live date, but to be implemented in SPRINTS" (C1P1a).

The research aims not merely to replicate the existing findings in the literature review but to enrich it by updating it with new themes, which closes the existing gaps and paves the way for new studies. The information gathered could be used to increase background knowledge in literature, as (C1P1a) above suggested integrating the implementation stage of LSS with the Agile approach, which would have been difficult to collect through quantitative methods (Muntaner and Gómez, 2003).

The fundamental benefit of using a qualitative approach is that it allows the researcher to explore exactly the participant's worldview about the situation under investigation. In doing so, "it allows us our insight and our blindness, and on a primary level cut our research into what is acceptable and unacceptable" (Tennis, 2008, p. 104). According to Merriam (2009), qualitative research provides a wealth of information in a natural environment, void of manipulation to produce organic results. As the research is completed, the main themes derived as the result of the data collected could be used for further quantitative studies. For instance, C3P1 stated that:

".... you use the agile we use automation digital because they give you a lot faster benefit okay, but when you exhaust all those options.... want to improve capex into productivity then you have to focus on LSS" (C3P1).

Highlighting that Agile is very good in automation but not in process change management as LSS might be. The researcher asserted that by narrowing down the areas where a particular methodology performs better provides a great contribution in literature and practice when it comes to selecting the appropriate methodology for the given situation. Furthermore, they could complement each other and serve as a reference point for other quantitative research with larger samples.

To sum it up, the researcher followed the qualitative approach over the quantitative one as a more compelling and contextual approach to research aim and objectives. Both quantitative and qualitative methodologies are best understood utilizing the employed models. Quantitative science mainly relies on variable-based models and usually employs a top-down generalization strategy from an abstract population to individual cases. In contrast, qualitative studies usually apply case-based models and a bottom-up generalization approach (Borgstede and Scholz, 2021). The next section will explain why SSM was selected as a preferred choice for the research amongst different qualitative approaches.

6.6 SSM as preferred research method amongst different qualitative approaches

The research aim is to evaluate LSS implementations in financial services using SSM. In the previous section, the qualitative approach was considered the most appropriate avenue to follow and meet the research's aim and objectives. Qualitative research predominantly uses methods of inquiry that produce text rather than numbers where textual data could include transcripts of interviews or conversations, free text comments

on a questionnaire (Holloway, 1997). The open-ended questions used in qualitative inquiries had no right or wrong answer but instead provided a framework for the descriptive process (Lindh-Åstrand et al., 2007). According to Avis (2005), qualitative research entails applying distinct methodologies, such as grounded theory (GT), phenomenology, ethnography, historical research, case studies (Polit and Beck, 2012) and SSM (Jackson, 2003; Mahalepa & Goede, 2017).

GT is “systematic generating of theory from data that itself is systematically obtained from social research” (Glaser, 1978, p. 2). Strauss and Corbin (1990) consider this approach beneficiary in judging generalizing the results obtained from data. Despite very well known qualitative methodology Meyers (2009) thinks that novice researcher would become inundated with coding level in GT, since it is very time consuming, tiring process risking to loose ideas and themes emerged from data collected. Whereas this issue in SSM as a structured discipline of thinking (Checkland & Scholes, 1990) this sort of risk is lower. Four activities of SSM (see Appendix I) Finding Out, Modeling, Comparing and Take Actions are very useful guides for the practitioners to accommodate the information retrieved from participants. Besides, Omona (2018) complained that number of Computer-Assisted Qualitative Data Analysis Software (CAQDAS) such NUD*IST, ATLAS/ ti, Decision explorer, Nvivo and Code – A – Text are needed to mitigate some of the barriers of GT qualitative analysis by manual methods such as limitations on size and complexity of data. In practice access to these applications could be difficult, expensive and requiring higher technical skills. On the other hand, when applying SSM someone needs only knowledge in English language by using the imperative verbs to introduce actions in conceptual models (Checkland, 1981) and a pen and a paper. Moreover both authors (Glaser & Strauss, 1967) of the book “Discovery of Grounded Theory” differ in philosophical stance of GT. According to Annells (1997) Glaser was influenced by the quantitative positivist paradigm, while Strauss by the qualitative interpretive paradigm (Annells, 1997). There is no doubt about interpretative paradigm of SSM (Checkland & Scholes, 1990; Jackson, 2000, 2003), which is very well matured in literature. Also, ElHussein et al., (2014) advises that the qualitative nature of GT could pose a threat to external validity as results of its limitations. For Bryant and Charmaz (2007) there are no standard rules to follow in GT, where in SSM main activities are well defined (Appendix I). Researcher’s aim was to produce a piece that is academically valuable but in the same time easy absorbable for

practitioners. Therefore pursuing systems thinking principles of SSM prevailed over GT as an approach for evaluating LSS implementations in financial services.

Phenomenology is a form of qualitative research that focuses on the study of an individual's lived experiences within the world (Neubauer et al., 2019). Whereas system thinking takes seriously the idea of the whole as entity that exhibit one property as whole which have no meaning in terms of its parts (Checkland & Scholes, 1990, p. 25). They suggest that to do SSM you have to come up some construct models (systems models) against the perceived reality in order to learn about it. On the other hand Giorgi (2010) criticized phenomenology for the ambiguity and lack of the standardization. Like SSM, phenomenology is interpretative, subjective is based in lived participant experiences, but presenting the findings is hard and not in fashion that practitioners would considers useful (Regoli, 2017) and uses the same set of soft wares used in GT for data analysis. Phenomenology is highly descriptive and not sufficiently interpretative (Hefferon & Gil-Rodriguez, 2011) and uses hermeneutic and contextual analysis to understand the cultural and people's experiences. (Smith et al., 2009). SSM goes beyond that with two stream of analysis, logical and cultural stream analysis or rational, social and political analysis (Wilson & Van Haperen, 2015, p. 35). SSM is a qualitative and participatory inquiry process where the expected outcome action improves via learning (Checkland and Poulter, 2010). During the learning cycle, the researcher will structure the analysis and debates to find an adequate consensus among the participants thus he preferred SSM to phenomenology as well.

On the other hand, Ethnography originated from the Greek word "ἔθνος", ethnos, meaning the folks, people or nation and "γράφω", grapho, and meaning "I write". It reveals how culture is defined and how the culture is understood (Scotland, 2012). The aim of the research is not explore the culture of participants, but to evaluate LSS implementations in financial services. Definitely culture is an important aspect of the evaluation but not solely criteria and the outcome. Participants will synthetized in terms of values, norms and behaviours in relation to implementing the LSS, whereas ethnography is focused in one particular phenomenon, leading to a criticism of lack of generalizability (Iacono et al., 2009). Furthermore the main source of data collection in ethnography is by thoroughly using observation (Myers, 1999; Reeves et al., 2008). The objective of qualitative research is to provide a deep understanding of the situation and to explore various aspects of the reality, which are hard to by quantified (Nixon & Odoyo, 2020). The aim of the research is to offer a depth understanding of LSS implementation in financial services, through extensive semi structured interview. By

relying merely in the observation, it was difficult if not possible to achieve the research aims and objectives. Therefore the researcher dropped this methodology as well.

Instead he has chosen a combination of case studies and SSM for evaluating LSS implementations in financial services. Case studies are appealing in advancing field knowledge base for innovation and challenging the current theoretical assumptions (Nixon & Odoyo, 2020). SSM is a qualitative interpretive approach meaning that the real world is not detached from the model, but constructed by those who experience it. SSMs are designed to create models of 'real world problem situations' in the 'systems world', so that the participants can better understand the problem and reach an 'accommodation' towards an acceptable solution for all stakeholders (Checkland & Poulter, 2006; Checkland and Scholes, 1990). SSM is by nature pluralistic, based on perceptions and is normal to come up with its criticisms too. Main criticism is that is difficult to implement since it is not problem solving tool, but problem identification approach (Clegg & Orme, 2012). Modelling makes some time problem definition difficult (lane & Olivia, 1998) and sometimes changes are not systemic (Flood & Jackson, 1991).

The researcher is very well aware that the core aim of the study is to meet the objectives. Still, on the other hand, he acknowledges the importance of producing an easy and understandable piece not only for scholars but also for practitioners. All qualitative methodologies discussed have their difficulties, but when it comes to meeting the research aims and objectives it became clear that the selection of SSM was well justified. The researcher also analysed different soft system thinking methodologies and explained why SSM was most appropriate option for his study (see Appendix I).

SSM is discipline of thinking for converting a messy situation in a structured way (Checkland & Scholes, 1990). By applying SSM the researcher is hopeful is contributing in practice by showing how SSM tackles the problems and investigates or evaluates a particular situation. It is concerned with unstructured or ill-structured situations where there is no consensus among participants. It tries to accommodate different perspectives via human conceptual models used to decide on interventions or improve the situation with LSS implementation in financial services (Sgourou et al., 2012). Hence, the significance of using the SSM is double folded- firstly, to evaluate the LSS implementations in financial services and secondly, to introduce the conceptual models as a structured way of thinking (Checkland and Poulter, 2006) in their organization.

The researcher used content analysis for participant's interviews to build rich pictures, root definitions, concepts models, issue-based problems, and the necessary arrangements for future actions to improve the situations. More details about the SSM structure and how it was applied in the current research can be found in the Appendix I. The researcher was also aware that the previous knowledge should be disregarded to avoid biases, but many aspects of the previous researcher's experiences were not related to LSS knowledge. After explaining the philosophical stance of the research and justifying his research methodology, the researcher moved in the data collection part of the chapter elaborating further the research samples, interviews, data analysis and ethical considerations.

6.7 Data Collection Procedure

6.7.1 Research Sample

The first obvious difference between qualitative and quantitative data analysis is that the data to be analyzed are text rather than numbers Morrill et al. (2000). As Michael Quinn Patton (2002) stated, "Qualitative analysis transforms data into findings. No formula exists for that transformation. Guidance, yes, but no recipe. Direction can and will be offered, but the destination remains unique for each inquirer, known only when—and if—arrived at" (p. 432). For the most part, the qualitative methods are intended to grasp a deep understanding, whereas quantitative methods are intended to get a breadth of understanding Patton (2002) added. Since qualitative research are mostly based on interpretative conceptual perspectives, it would become meaningful only if the samples selected are information-rich, and the analytical skills of the researcher are high (Shaheen and Pradhan, 2019).

In this context, criterion sampling involved reviewing and studying 'all cases that meet some predetermined criterion of importance' (Patton, 2002, p. 238). The current research initially identified financial services where LSS was implemented and after the participants who were part of these LSS projects were contacted and interviewed. The researcher reflected realistically and critically for applying these criteria since a small number of studies could turn the synthesis of findings into questionable (Suri, 2011). The sampling strategy in the research was entirely influenced by gaps identified in the literature review where is a desperate need to hear the voice of LSS practitioners about their experiences on LSS implementations in financial services. Qualitative researchers generally value case studies (or multiple-case studies), whereas quantitative researchers

tend to value large sample sizes and true experiments or quasi-experiments (Suter, 2012). Hence, the researcher was very demanding in himself to expand the domain of his research in banking and fintech and financial shared service centers.

Besides, qualitative methods emphasize saturation by continuing to dig until no new substantive information is acquired (Miles and Huberman 1994), who else better than people who participated in the projects can provide this sort of information. Palinkas et al. (2015) suggested that from the perspective of the qualitative approach, the participants should meet a specific criterion or possess intimate (or, at the very least, greater) knowledge of their experience, making them information-rich cases. It could happen to be a small size but with a high volume of narrative data that needs to be analyzed to identify trends that help to answer research questions (Polit and Beck, 2014). Rutberg and Bouikidis (2018) agreed that selecting a sample population in qualitative research starts with identifying eligibility to participate in the study based on the research question. The participant needs to have had exposure or experience for the subject being evaluated. The researcher started with few basic standard questions and later evolved with other questions following participants' answers. Each participant in the research has been part of the LSS project whose views were very important compared to LSS accredited stakeholders. There were representatives from the project LSS team, departments directly impacted by LSS applications, and other indirectly impacted departments. Furthermore, what makes the current research unique is diversity not only within the domain of financial services (banking, fintech and shared service centers) but in geographical contexts. The events happening in the study include applications of LSS in Europe and Asia and enrich the existing literature with very useful cultural and technical insights in the way they applied LSS in their organizations. As suggested by Hellman et al. (2019), all the face-to-face interviews with participants were held in the participant's workplaces to make them convenient and feel comfortable about the interview process. There were in total 17 interviews with 15 participants distributed in four case studies. Two additional interviews in two different cases were part of the follow-up plan between researcher and participants, which served better to accommodate some of the findings (Table 7).

The researcher used the data saturation concept to validate the sample size chosen. Glaser and Strauss (1967) defined saturation as the point at which "no additional data are being found whereby the [researcher] can develop properties of the category" (pg.

61). There is no golden rule on defining the number of interviews. Still, Guest et al. (2020), in their bootstrap analysis using the $\leq 5\%$ new information threshold, indicated that typical 6-7 interviews would capture most themes in a homogenous sample,

Case number	Participant number	Number of interviews	Participant' combined code in research
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whereas in retrospective studies is lower. In the current research, saturation was reached within four interviews for a case study. The semi-structured interview was the foundation of the inquiry. Organization and participant's names were anonymized (See Table 7) to confirm the ethics SHU guidelines. After DB2 completion, a list of potential cases within and outside of the UK was prepared.

Table 7.

Research participant's codes.

Case 1	Participant 1	2	C1P1a, C1P1b
	Participant 2	1	C1P2
	Participant 3	1	C1P3
	Participant 4	1	C1P4
Case 2	Participant 1	2	C2P1a, C2P1b
	Participant 2	1	C2P2
	Participant 3	1	C2P3
	Participant 4	1	C2P4
	Participant 5	1	C2P5
Case 3	Participant 1	1	C3P1
	Participant 2	1	C3P2
Case 4	Participant 1	1	C4P1
	Participant 2	1	C4P2
	Participant 3	1	C4P3
	Participant 4	1	C4P4
4 Cases	15 participants	17 interviews	17 codes

(Islamaj, 2021)

The researcher used his previous experience in financial services and relationships with several executives in that domain to provide required access for the research. It happened that this access was also a significant contribution to this study. While the researcher was initially quickly successful in accessing some financial services, the necessity to extend the domain of LSS's research in other financial services domains emerged. The researcher used lockdown disadvantage due to the covid-19 pandemic in March 2020 to refresh his pipeline with new participants. The researcher didn't exercise any personal judgment on who must participate in the study in the current research. The main criteria were the financial services domain and only the people who have been part of LSS implementations, starting from stakeholders who asked that initiative (LSS project) up to those affected with changes in daily operational lives due to the result of LSS application.

To have the access granted, the researcher introduced and explained the research scope alongside the participant information sheet and consent form when asking for permission for the research. He promised and delivered anonymity of participants' identities and promised to share a copy of the thesis in case of a successful final

examination from the university. Interviews lasted somewhere between 20 min -30 min. The researcher noticed that his initial requests for one-hour interviews failed to have an approval ground from participants. Therefore, to mitigate any uncovered issue during interviews, the researcher sent the questions to participants in advance and offered them a time buffer in several days to get ready for the interview. This was a prerequisite for all participants to carry on with interviews. This approach resulted successfully, and the researcher was happy with the coverage area of subject matter he managed during the interviews. In the next section, the researcher will provide more information about the managed interview process.

6.7.2 Interviews

According to Oakley (1998), interviews are the most common format of the data collection process for quality research. They provide a sort of framework in which the practices and standards are recorded and challenged. They come in different formats: semi-structured, lightly structured, or unstructured (Mason, 2002). Corbin (2003) thinks that unstructured interviews are generally suggested for long-term fieldwork to give the respondents adequate time and space to express themselves. They typically begin with a very general question and use the participant's answers as a guide when they continue with additional questions for understanding the situation he is investigating.

This doesn't happen in semi-structured interviews, which are based on a semi-structured guide for questions that the interviewer needs to be explored (Crabtree and DiCiccio-Bloom, 2006). As mentioned earlier, the researcher employed semi-structured interviews for the current research. LSS in financial services was uncharted territory for him, with many barriers identified in the literature. Hence, he used the semi-structured interview as leverage to build the maximum space for himself to spot useful leads (Adams, 2015). For Corbin and Strauss (2014), these types of interviews are conducted with an individual or with a group and generally have the duration of 30 min to more than an hour. To better grasp the situation and have data captured more effectively, the researcher recorded the conversations with participants upon their prior agreement (Creswell and Poth, 2016; Jamshed, 2014). The recording of the interviews helped the researcher focus more on the interview content as he went through questions collecting open-end data to explore participants' thoughts, feelings, and beliefs (DeJonckheere and Vaughn, 2019).

The interview aimed to bring the research from participants' experience with LSS implementations in their organizations. Therefore, the researcher designed the interview structure and questions with a shallow degree of complexity and abstractionism. Discussions flowed naturally from the roles involved in LSS, issues that triggered LSS to start, tools they have used to measure the problematic situation they were facing, steps they undertook to improve the situation, and finally, their suggestions for the future. Many interviews were held in face-to-face mode. More precisely, fourteen (14) out seventeen (17) interviews were in person; one interview was conducted via video skype call, and the remaining two were through zoom. In face-to-face interviews, the interaction between the researcher and participants and in a safe and very comfortable way in all participants' workplaces. The advantage of using this approach was that the conversation was direct and delayed due to unforeseen technical problems (Opdenakker, 2006). The main disadvantage of using this mode of interviewing, and the researcher felt during his research, was that it took a long time to arrange them. Besides, these methods will not keep the same golden status as best approaches during and after the pandemic.

On the other hand, qualitative interviews performed via video calls were trustworthy alternatives to face-to-face interviews and served their purpose in current research as more while conducting the interviews while boosting the researcher's chances to conduct interviews with no geographical barriers (Saarijärvi and Bratt, 2021). However, the researcher showed a higher degree of cautiousness during video interviews. He managed to provide a secure and stable internet connection, and for any unclear topic, he asked acknowledgments from participants to set the same understanding from both sides (Krouwel and Greenfield, 2019). The interviews were held in a quiet, locked place with no possibility for any other persons or noise interferences to provide the same participant's comforts as possible as in their workplaces. They were all held in English. Before each interview, the researcher briefed all participants about the scope of the research, ethical process alongside the interview, and expectations from their side. He also advised them that they were free to withdraw from the interview at any moment without any explanation. He also provided to them the required contact points in case of any complaints. The researcher stressed many times that the participant activity in the research will be anonymised. He also advised them that if they need a summary of their comments or how the researcher applied in findings' analysis the researcher is willing to provide them.

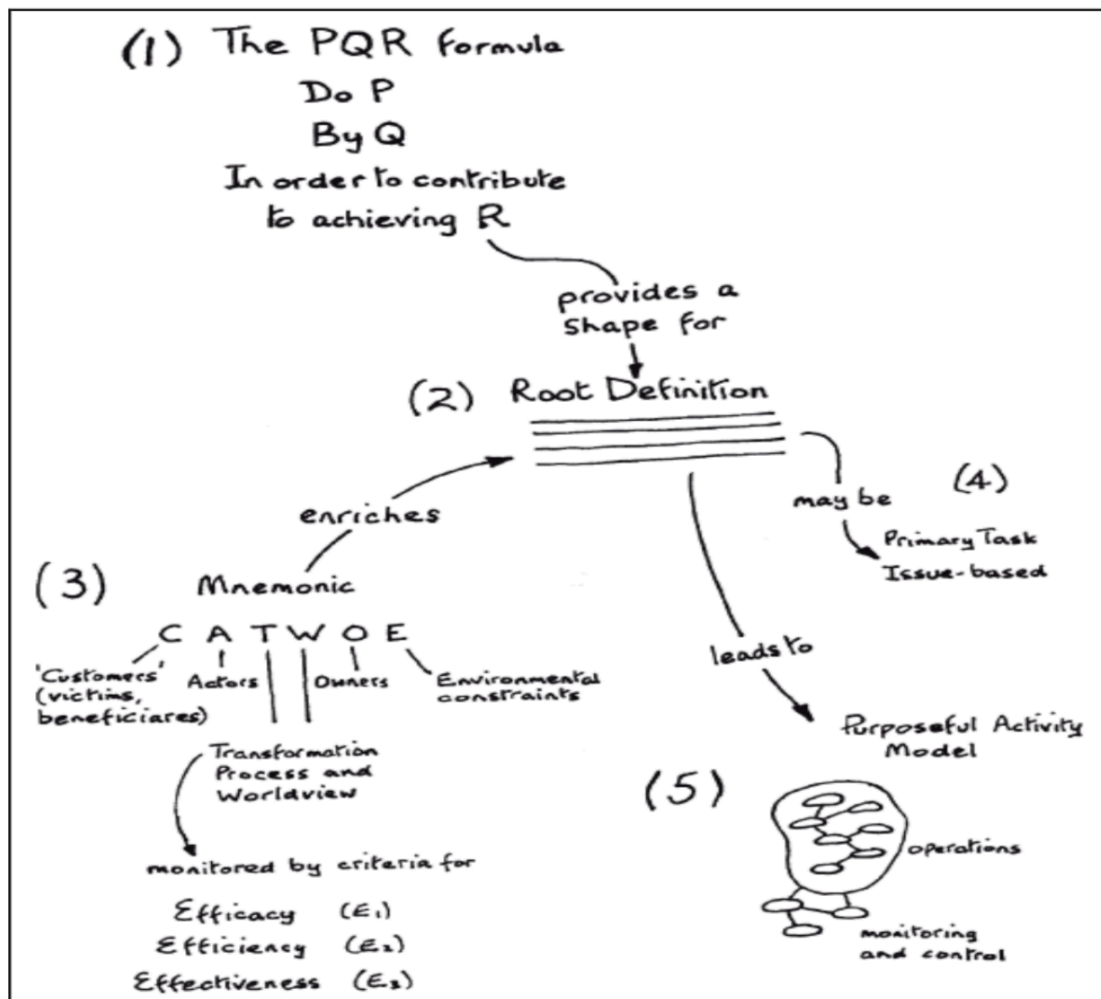
Once the interviews were completed, both sides signed the consent form, while the recordings were downloaded to the researcher's one drive SHU account. Interviews were manually verbatim transcribed, ensuring nothing was missing from participants' comments. Jacobs (2019) astonishingly commented that the research is useless if it isn't accurate, documented, and well preserved. That's why transcribing, which might look time-consuming, in fact, is timesaving. Writing transcriptions are more accessible are easier to understand, and above all, they use less memory, she added. A copy of all transcriptions will be available for the examiners in viva. Transcriptions were stored in password-protected mode, while the computer used in the research was hdd encrypted, updated with the latest McAfee antivirus, and accessed through a strong authentication procedure. The researcher then used the full transcriptions to explore the LSS implementations in financial services using four stages of SSM mode 2, which the researcher will introduce in the following section.

6.7.3 Data Analysis

This section explains the analysis of data transcribed from participant's interviews and how it helped the researcher articulate and understood perspectives. The researcher highlighted in the methodology section that he would rely upon four main activities (Checkland and Poulter, 2006) of SSM Mode 2 ('finding out,' 'modeling,' 'debating' and defining 'actions to improve') (Figure 19) to carry out his research. The researcher aimed to tackle the problem in the given organization and followed the Analysis One of intervention (Checkland, 1990) to reach his goal. Thus, the researcher prepared questions in his semi-structured interviews based on the components of SSM mode 2. This approach doesn't necessarily require any prior SSM knowledge from participants. None of them was aware of this methodology. Hence for data collection purposes, the researcher developed open-ended questions that represent the real-life of practitioners based on PAM activity guidelines.

Figure 20

PAM Building Guidelines.



(Checkland & Poulter, 2006, p. 40)

This approach helped the researcher that when data were analyzed, he linked the participant answers directly to the components of SSM 2 and ultimately matched them towards research aims and objectives. Augustsson et al. (2019) noted in their study that the fundamental idea behind SSM is that the process of inquiry into the complexity of the 'real world' must simulate a learning process from defining the problematic situation until taking action to improve it. They translated the 'Real Life' notion in SSM language as the flow of ideas and events experienced in everyday life and is distinguished from conceptual models that learn about the 'real world' and improve the situation created. Developing SSM models helped the researcher identify gaps in participants' answers and applied follow-up sessions in some cases. The research aims to explore LSS

implementations using SSM and evaluate how LSS projects were deployed in the organizations that had the utmost importance for the researcher to reach the goal. Therefore, the researcher started the interviews by identifying main stakeholders, associated structures, issues that triggered the LSS project to start to build a high level of understanding of the situation. Some of the questions that the researcher used for initial understanding of the situation were:

What are the key Processes, People, Structures, Issues, or Conflicts --- (during Lean Six Sigma implementation)? How does the Lean Six Sigma project start? What triggers it to start?

Researcher

As an outcome of the participant's answers, the researcher expressed the situation in the form of rich pictures showing in pictorial view structures, peoples, concerns, issues, and relationships among stakeholders. A rich picture is a holistic drawing or an impression of a problem area of interest that is formulated using interviews (Checkland & Poulter, 2006). The second activity is about modeling using purposeful activity based on participant worldviews. It is not intended to be a perfect model but was a firm reference for the researcher to prepare the stage for discussions, learn about the situation in a structured way, and helped him to make necessary suggestions for improvement (Mahalepa and Goede 2017).

According to Augustsson et al. (2019), SSM theory articulates several tools for facilitating the formulation of PAMs – root definitions (RD), QPR formula, CATWOE elements, and three Es. The researcher used the QPR formula 'Do P by Q to contribute to achieving R' to validate the process of RD (Checkland and Poulter, 2006) and used the Input-T-Output model in discussions with participants as they found it easier to understand. After that, defined the elements of CATWOE frameworks using previous information that emerged in the first phase is used such as C (customers), A (actors), W (worldview), O (owners), and E (environment) contextual factors affecting the PAM. The researcher used triple Es as evaluation criteria to assess if the transformation process is: (1) producing the intended outcome, (2) achieved with minimal resources, and (3) achieves a long-term goal (Checkland & Poulter, 2006). Using Input-Output and CATWOE, the researcher built the RD, which happened in the current research in two forms: Primary Task RD and Issue-Based RD. To identify Primary Tasks and Issue-

based problems, the researchers asked all participants directly the following questions using the notion of I-T-O.

"Primary tasks are usually those related to your "core" process. If, for one moment, we may imagine the LSS as a whole engine or as one system, what could be the key Inputs and Outputs of the outlined system? Input-Transformation-Output?"

While we talked about primary task, can we discuss about issue-based problems? Issue based processes are usually activities that makes primary task to not work well. They are related with training, awareness, motivation, brainstorming, or guidelines. Following this and using Input-Output Model, how an issue Based looks like?

Researcher

Once RD of Primary Task and Issue Based were defined, the researcher started the process of building the relevant PAMs. It has to be noted that all activities (in the form of imperative verbs) in the PAM are those carried out by actors identified in the CATWOE framework (Checkland, 1999). Some questions used at this stage:

How the primary task goes from A to B? Can it go to somewhere else? How the systemic is the primary task chosen? Who are victims/ beneficiaries? When the take off happen? Which are normal states and exception?

Researcher

Also, it was crucial for the researcher to identify feedback loops to measure the success of transformation and validate the findings (Gasson, 2021b). The question used in this case was:

How is the performance measured?

Researcher

The researcher considered feedback loops as the most important elements in conceptual models since they enabled him to measure the transformation's success and ultimately validate the findings (Gasson, 2021b). The researcher identified and applied two types of feedback loops: internal and external, controlling and balancing each- other. As an

outcome of this process, the researcher built the conceptual models for the primary task identified, including purposeful activities performed by actors daily and controlled by internal and external main performance measurement indicators. He preferred the baseline descriptive model (AS IS) to accommodate participants' views (Hindle and Franco, 2009). The information gained from rich pictures and PAM the researcher used to organize the debate about potential improvements (Checkland, 1999b). The simulated model build by the researcher was used to structure the discussions of future changes. He used the first approach for debating using PAM as a reference (Checkland and Poulter, 2006, pp. 227-229) to locate the differences. This debate aimed to seek those changes suggested were both desirable and feasible (Kotiadis et al., 2013). Some of the questions applied from the researcher on these discussions were:

Where in the process happen repetition and why?

What processes works and does not work well? Where delays may exists in cycle? What parts of the process you want to eliminate and why? Where changes in organization, can be applied? Any recommendation in terms of organization point of view? What is the main change after the implementation? What makes LSS effective? What were the main challenges in LSS implementation?

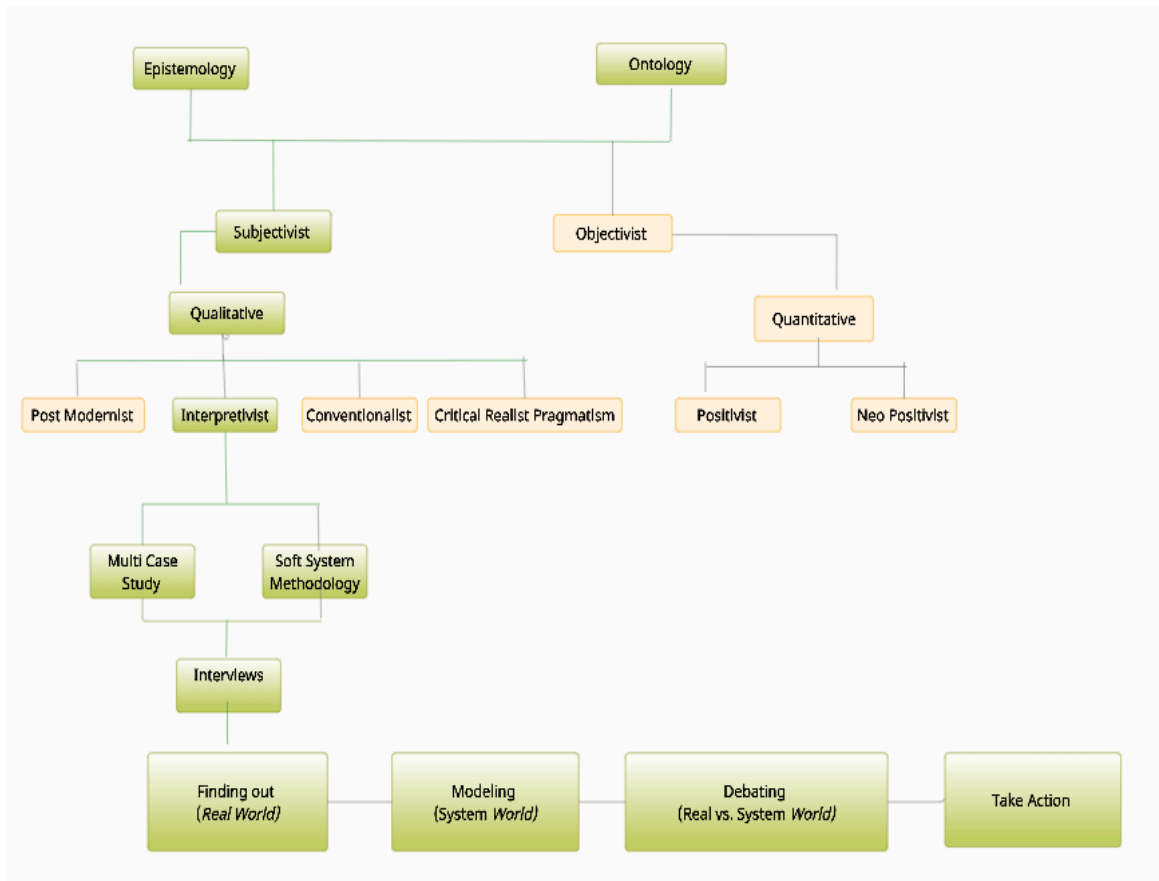
Researcher

The research used only primary data in the current study since participants agreed not to use any secondary data from/within the organization like previous LSS projects docs, flip charts, etc. The researcher didn't use SSM to develop interviews and pretend the participants used soft system thinking to solve the situation. Instead, he used the SSM to guide the understanding and communication with participants to meet research aims and objectives. The first part of the analysis was used to address the first research question of 'how has LSS been deployed in financial services?' including main stakeholders who participated in the project, reasons why the project was started, and tools used. The third and fourth parts researcher used to further explore 'how was the intervention managed?', 'was it effective'? Using feedback loops and, most importantly, identifying and addressing issue-based problems 'what were the main challenges in LSS implementations' and how participants think they could overcome them. Using a qualitative over quantitative approach was an excellent choice for the researcher as he could cover quite an extensive range of the problems to fill blind spots (Busetto et al., 2020) of LSS applications in financial services.

The researcher also extended the philosophical approach employed in the research by four main activities of SSM Mode 2 to show a holistic view of his journey (Figure 21).

Figure 21

Research Methodological Approach



(Islamaj, 2021)

In the next section the criteria of qualitative research will be explored and evaluated refereeing SSM Mode 2 stages.

6.7.4 Criteria of Qualitative Research

“At this level, qualitative research involves an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural setting, attempting to make sense of, or to interpret, phenomena in terms of the meanings people bring to them”

(Denzin and Lincoln, 2000, p.3)

Ragin (2004, p.22) suggests that the formulation should be inclusive when defining the qualitative approach, emphasizing main strengths, not what it lacks. Qualitative research is an iterative process in which improved understanding of the scientific community is achieved by making new significant distinctions and getting closer to the phenomenon studied. It is consequently a combination of two criteria: (i) how to do things – namely, an iterative process in which one gets closer by making distinctions, and (ii) the outcome –improved understanding novel to the scholarly community (Aspers and Corte, 2019). They suggest that doing detailed qualitative research becomes easier to communicate findings since standards make it easier to separate good qualitative research from a bad one.

In the current research, the researcher's standards to evaluate the quality of the qualitative and data collection process were seven principles from Klein and Myers (1999). They argued that seven principles are mainly used for evaluating interpretive research that includes the interpretation of human views. SSM Mode 2, as explained earlier, falls into interpretative epistemology and is highly subjective. Therefore, the researcher followed principles set out by Klein and Myers (1999) in table 8 below.

Table 8

Research Evaluation Principles.

Summary of seven principles for interpretative field research	
The Hermeneutic Circle	“This principle suggests that all human understanding is achieved by iterating between considering the interdependent meaning of parts and the whole that they form” (p. 73).
Contextualization	This principle “requires critical reflection of the social and historical background of the research setting, so that the intended audience can see how the current situation under investigation emerged” (p. 72).
Interaction Between the Researchers	It “requires the researcher to place himself

and the Subjects	or herself and the subjects into a historical perspective” (p. 74).
Abstraction and Generalization	This principle “requires relating the idiographic details revealed by the data interpretation through the application of principles one and two to theoretical, general concepts that describe the nature of human understanding and social action” (p. 72).
Dialogical Reasoning	The most fundamental point is that the researcher should make the historical intellectual basis of the research (i.e., its fundamental philosophical assumptions) as transparent as possible to the reader and himself or herself” (p. 76).
Multiple Interpretations	“The principle of multiple interpretations requires the researcher to examine the influences that the social context has upon the actions under study by seeking out and documenting multiple viewpoints along with the reasons for them” (p. 77).
Suspicion	This principle “Requires sensitivity to possible ‘biases’ and systematic ‘distortions’ in the narratives collected from the participants” (p. 72)

(Klein and Myers, 1999)

The following Table 9 use the summary of seven principle as a reference and explains how their respective principles were followed in four stages of SSM Mode 2 inquiry process.

Table 9:

Application of Evaluative Principles in the Current Research.

Research Method Guidelines and seven principles in interpretative research.	How is it achieved?	Methodology stages
The Hermeneutic Circle	This principle is achieved by understanding the worldviews of all stakeholders involved in LSS implementations in financial services from perceiving the situation until action taken for change.	All stages in SSM Mode 2.
Contextualization	This principle is achieved by identifying initially what triggered LSS project to start, who were main stakeholders, structures, process, issues and conflicts. What were main challenges and how they there overcome.	Stages one and two of SSM Mode 2. Issue based problems
Interaction Between the Researchers and the Subjects	This principle is achieved by identifying CATWOE elements and clarifying problem owners, solvers, customer	Stages one and two of SSM Mode 2.
Abstraction and Generalization	This principle is achieved by exploring the contribution of SSM mode 2 in practice and academia with further research.	Reflections after stage four of SSM Mode 2.
Dialogical Reasoning	This principle is achieved by exploring the contribution of SSM mode 2 in practice and academia with further research.	Reflections after stage four.
Multiple Interpretations	This principle is achieved by accommodating all participants views in the debate for improving	Stage three and four of SSM Mode 2

	the situation.	
Suspicion	This principle is achieved by establishing internal and external feedback loops, which were used to measure the success of interventions.	Stage two of SSM Mode 2

(Islamaj, 2021)

To increase the transparency and eligibility of using SSM, the researcher used all respective citations and references, validating each step he undertook was compliant with the SSM framework.

Also, the researcher included quotations from all participants in the research, mainly when it came to comparing the real world with the system world, taking actions for change, and reflections to support that his claims were backed up via participants' feedback. In the next section, the researcher will discuss the ethical considerations of the research following the ethics committee's approval.

6.8 Ethical Considerations

"Researchers need to protect their research participants; develop trust with them; promote the integrity of research; guard against misconduct and impropriety that might reflect on their organizations or institutions; and cope with new, challenging problems."

Creswell (2009, p.87)

According to Denzin and Lincoln (2011), the cornerstone of ethical research is 'informed consent' with both elements 'informed' and 'consent' requiring careful consideration and application throughout the study. Participants have to be fully informed of what they will be asked and how the data provided by them will be used. They also should provide explicit understanding, signed consent of taking part in the research, including their rights to access their information and the right to withdraw from the researcher at any moment (Fleming and Zegwaard, 2018).

Research ethics refers to the guiding moral and ethical principles by the Economic and Social Research Council (2020) [ESRC], stating that students should conform to all legal requirements, including data protection under the ESRC (2020) Research Ethics

Framework. The ethical issues of informed consent, risk of potential harm, confidentiality and anonymity, and conflict of interest were considered, and a plan was presented on how these issues will be managed (Fleming and Zegwaard, 2018). SHU's (2020) ethical guidelines state if a student carries out research that involves participation from humans, then University approval is required. No risk was identified in the current study, and the SHU ethics committee approved the research under the "low risk" category since no vulnerable group of participants (Arifin, 2018).

Furthermore, no confidential information, no financial data, no secondary data about any LSS projects in financial services was required from the researcher. The information sheet sent electronically by the researcher prior to each interview ensured that the participants gave informed consent as they were made aware in advance of the research aims and objectives. On the interview date, the researcher again reinforced the university ethical rules and acknowledged the participant's rights to withdraw from the interview in a moment without any explanations. The researcher insisted that their names and company names would be confidential and masked throughout the entire thesis. He provided to them the contact points in case of complaints. The researcher made them explicitly aware that their data is purely related to the research' contribution. All participants were happy with the researcher's explanations and agreed to proceed with interviews.

In the end, after conducting 17 interviews, no complaints were raised, and the researcher considers that it is safe to conclude that participants were happy with explanations from the researcher for the whole process.

6.9 Chapter 6: Summary

In this chapter, the researcher discussed the philosophical stance that helped him prepare the research design and choose the research methodology. He explained his philosophical positions based on research questions and literature gaps, demanding the researcher apply an interpretative approach to understand 'how has the LSS been implemented in financial services?'. This approach greatly impacted selecting the SSM as an adequate research methodology in the current study. SSM provided all the necessary tools to assist all stakeholders in articulating their perspectives when they applied LSS in their organizations. SSM is a highly interpretative approach and

grounded in soft system thinking, where systems are viewed as purposeful activity models to make sense of a messy environment. (Checkland, 1999).

The interpretive flavor of SSM acknowledges that such systems are better understood through gaining a subjective perspective of the views and meanings of those involved (Jackson, 2000). It reinforces the importance of considering how the social reality is constructed through conversations and actions, unlike hard approaches that neglect worldviews (Checkland & Poulter, 2006). The original focus of SSM was organizational rather than academic (Mahalepa and Goede, 2017). The researcher asserted a strong relationship between research questions, literature gaps, and participants' comments during the interviews. He also explained the data collection process, tools used to obtain, save, and analyze the data collected from all participants, alongside explanations on complying with ethical considerations stipulated in university guidelines. In the next chapter, the researcher will provide various discussions, findings, and reflections from participants embedded in various empirical studies of LSS implementations in financial services.

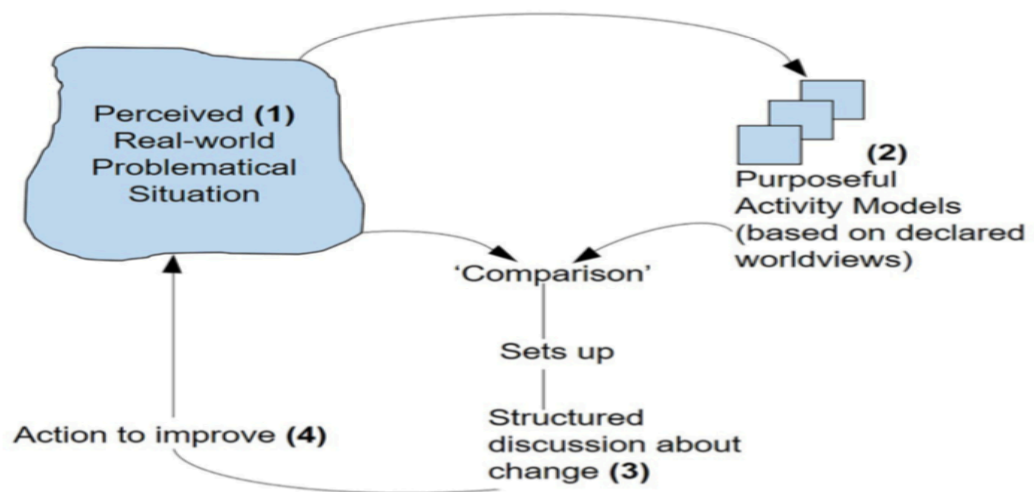
Chapter 7. Primary Research - Findings and Reflections

7.1 Introduction

In this chapter, the researcher will present findings and analysis of the primary empirical research. It will answer the first research question; *how has the LSS been deployed in financial services?* It also explores the challenges of LSS implementations and brings forward the experiences from different practitioners in dealing with those challenges. As explained in the methodology chapter, the researcher used four SSM Mode 2 learning cycle activities to evaluate the LSS applications in financial services (Figure 22).

Figure 22

SSM Mode 2 Learning cycle



(Checkland & Scholes, 1999, A. 55)

SSM is an approach that can explore in detail and facilitate change in complex situations; hence this chapter offers a clear understanding of financial services stakeholders' views and actions when employing LSS in their organizations.

Therefore, in this chapter, the researcher will explain how he applied the SSM explained in the methodology chapter. The researcher will represent the findings in rich pictures, conceptual models, debate, and take actions format. There are in total four case studies named cases 1 - 4. Each case study introduces the organization where the research is held, clarifying its stance about the financial services context. It continues with the first two parts of analysis; understanding the problematic situation and express it using in an

unstructured way via rich pictures followed by purposes activity models in system thinking world that explain the purpose of the main activity under investigation. Sections three and four in each case are dedicated to debate and action taken for change (Figure 2), whilst the limitations, alongside with researcher's reflections, will conclude each case study. Throughout the findings, particularly the stages three and four of SSM and reflections, the researcher will include some of the participants' comments (in a very low margin compared with total data obtained from all interviews). The reason for doing this is to voice their understanding and increase the transparency of the researcher's interpretative analysis for the current research.

Case 1 - Bank

7.1.1 Introduction

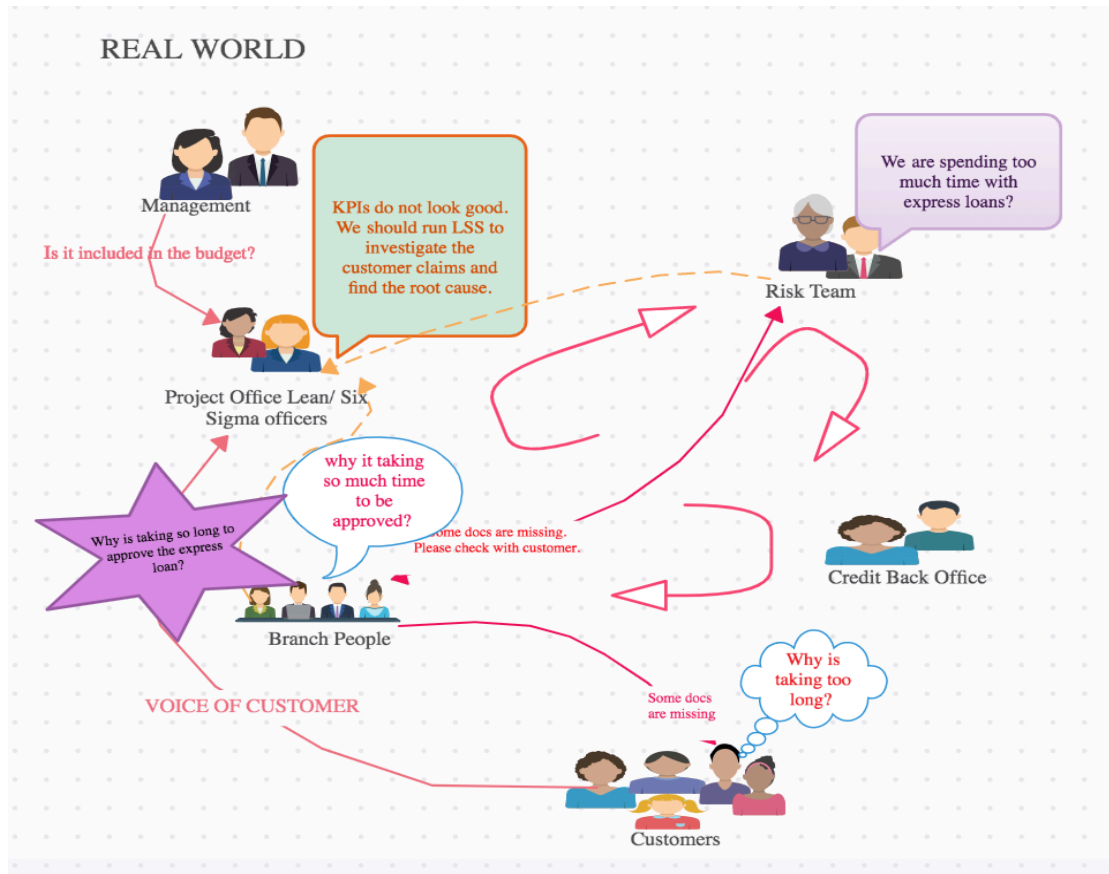
Case -1 Bank is part of a large European International bank with a long tradition and history in financial services. Their headquarters are positioned in Europe and have an extensive banking network across Central and Eastern Europe. They offer all kinds of banking services ranging from consumer banking, investment banking, and asset management products. The current research took place in one of its subsidiaries in the CEE region, explicitly in Albania, and analyzed the LSS project of Express Loan product for private individuals.

7.1.2 Perceiving and Expressing the Problematic Situation

The researcher started to examine the situation by initially identifying the soft issues of the organization such as issues, roles, communication, structures, relationships, and then expressed the understanding he gained from initial perceptions in an unstructured way as shown in the rich picture (Figure 23). This step was essential for the researcher as it allowed him to illustrate his perceptions in interactions among different actors (Checkland & Poulter, 2006). Concerns, conflicts, or back and forth situations between different roles, relationships are depicted using think bubbles, loops, or arrow lines from one group to another.

Figure 23

Rich Picture Case 1.



(Islamaj, 2021)

As indicated in the figure, concerns coming from customers are considered critical. These concerns were reported directly to the branch people, the first customer contact, or obtained directly from the LSS team using various tools. However, as shown in the picture, there are comments from managements that are understandably worried about the budget before each initiative from project office employees; as soon as approval is granted, then LSS officer...*identifies process owner and officers and we start the measurement. In the beginning we make interviews with the internal customers....and also with interviews with some customers that had an express loan with the bank... as the voice customer is not measurable we converted it in measureable CTQs as per methodology, and then CTQ are converted in KPI so identify KPIs which are very important to identify the right one for measuring the processes (C1P1a).*

The main concern presented at this stage is that the express loan product that is supposed to be delivered quickly takes a bit longer. Lines with arrows show the customers express their loan request to branch people who moves their request to the risk team for further risk evaluations. Upon meeting successful eligibility scoring criteria, the customer request is transferred to the credit back-office team for cash loan disbursement.

The rich picture shows some loops amongst the three roles of branch people, risk team, and credit back office, which indicated some back and forth between them regarding customer request handling, missing docs, etc. Consequently, these back and forth were translated in a bit longer approval time that were presented using think bubbles alongside the roles. As mentioned earlier and shown in the rich picture, these concerns were converted from the LSS team in the measurable KPIs, acknowledging customers' concerns triggering the LSS project to start for the express loan. Engaging in the rich picture helped the researcher transform the unknown problem into an expressed situation, enabling him to select the most relevant theme from the participant's content interview analysis (Checkland, 1985).

The researcher asserted that the core activity was to process the customer's express loan requests, while current performance indicators were not at the organization's levels. Furthermore, the researcher later identified the concerns for the core loan activity; there were concerns about implementing the improvements suggested by LSS to improving the primary activity or task under investigation. Therefore, when outlining CATWOE, Root Definition (RD) for processing customers' loan requests in time, the researcher developed two RDs. RD Primary Task that was easily identified when he designed the rich pictures and RD Issues Based that emerged later in the debate and take action sections.

7.1.3 Modeling- Formulating Purposeful Activity Models (PAMs)

7.1.3.1 CATWOE – Root Definitions

To prepare the conceptual model of the number of identified purposeful activities, the researcher used three tools to facilitate building them. Root Definitions (RDs), Input T Output model or QPR formula, CATWOE elements and three Es (Augustsson et al., 2019). In the absence (see limitations) of workshops with participants to allow them to define several RDs and then accommodate their worldviews, the researcher asked them to imagine the entire situation as an engine and asked them to pinpoint the input and

outputs of each situation the imagined system. Almost all of them agreed the core transformation of a customer loan requests to disbursement is the actual loan application system of the express loan product. While the conceptual model is incomplete without the specific information that guides the change, the researcher builds the CATWOE framework using the knowledge gained in the first stage.

C (Customers benefiting from activities in the system): Bank Customers applying for loans.

A (Actors performing activities in the system): Branch Employee, Risk Team (Risk and legal) and Credit Back Office team.

T (Transformation process): Transforming customer loan requests into loan disbursement

W (Worldview or Weltanschauung of the system's existence): Use LSS application to measure and ensure that customer loan requests are delivered in acceptable time terms for customers and the bank.

O (Owners of the system): Case -1 Bank's Management team

E (Environment's constraints): Budget, competition, fintechs, and regulations.

A root definition is a single sentence that captures the essence of the specific situation (Wilson and Van Haperen, 2015, p. 21). The researcher continued to enrich it using the information from the CATWOE framework.

RD1 – Primary Task:

A bank's management teams owned system, operated by branch, risk and credit back-office employees to enable consistent delivery of express loan products following LSS continuous improvement approach to ensure the express loans are disbursed in the acceptable time for customers and bank management team within the constraints of budget, completion, and regulations.

The researcher used the QPR formula 'Do P by Q to contribute to achieving R,' validating the RD primary task process (Checkland and Poulter, 2006). He applied the QPR formula as following: To deal with customer's loan requests (P) using/ submitted

in the loan application system (Q) to disburse customer's loan request (R).

During discussions with participants, the researcher identified an issue-based problem. In the current research, the main concern from participants was that improvements identified during the LSS project are taking longer time to implement and, in some cases, are not implemented at all. These are types of issues that do not fall with organization boundaries, are temporary, and cause the primary task not to perform well (Wilson and Van Haperen, 2015). Ideally, it has been to prepare a new CATWOE for the issue-based problem. Still, due to limitations in field research, the researcher prepared RD2 for an issue-based problem using participants' worldviews and the primary transformation process identified for this purpose.

RD2 – Issue Based:

A Bank's management team process or group of processes, operated by bank's employees, to identify and implement IT changes emerged during LSS project by undertaking a derivation of information in affected areas, which can satisfy business requirements, using Agile methodology but constraint in time, budgeting and training arising from it.

The researcher used again QPR formula 'Do P by Q to contribute to achieving R', for validating validate the process of RD issue-based (Checkland and Poulter, 2006) as follows: To deal with changes identified during the LSS project (P) using Agile approach and Agile teams (Q) to implement them (R).

In the next sections, the researcher formulated the conceptual models for purposeful activities identified in the case – 1 Bank.

7.1.3.2 Primary Task Conceptual Model

Once the researcher prepared CATWOE elements and RD for the primary task, he built the respective conceptual model (Figure 24). Some of the main activities carried out by stakeholders...*the customer goes to the branches to apply for a loan and then after that, the branches received for the customer application and send it to the risk for further analysis. After that risk, approves or rejects, the loan informs the branches, signs the approval form send it to the retail to sign it and then the retail sends the approval to the branches then the branches prepare the loan documents such as contracts and other forms needed for the customer (CIP2)... Then after completing these documents...goes*

to legal to sign the contract and then go for disbursement (C1P4).

In order to evaluate purposeful activities in conceptual model the researcher used triple Es's approach (Checkland & Poulter, 2006).

Efficacy — All activities included in the conceptual model should represent the transformation. In current research is a loan application system that transforms customer loan requests in loan disbursement as output. These are the activities carried out by main actors identified in CATOWE or victims and beneficiaries if the primary task fails. In the current research, victims/ beneficiaries were customers and actors who access and use the loan application system daily.

Efficiency — researcher used minimum resources to obtain the output of the transformation.

Effectiveness— Activities included in the conceptual do meet the organization's long-term goals by ensuring no gaps among activities for the end-to-end cycle and consistency in delivering the loan requests.

For building the conceptual model, the researcher used the Checkland (1990) suggestion in aiming 7 ± 2 activities per conceptual model where each activity starts with a verb in imperative or command form. The arrows show the logical dependencies from one activity to another, meaning that some outputs or sub-processes from previous activities need to be completed for starting the other activity.

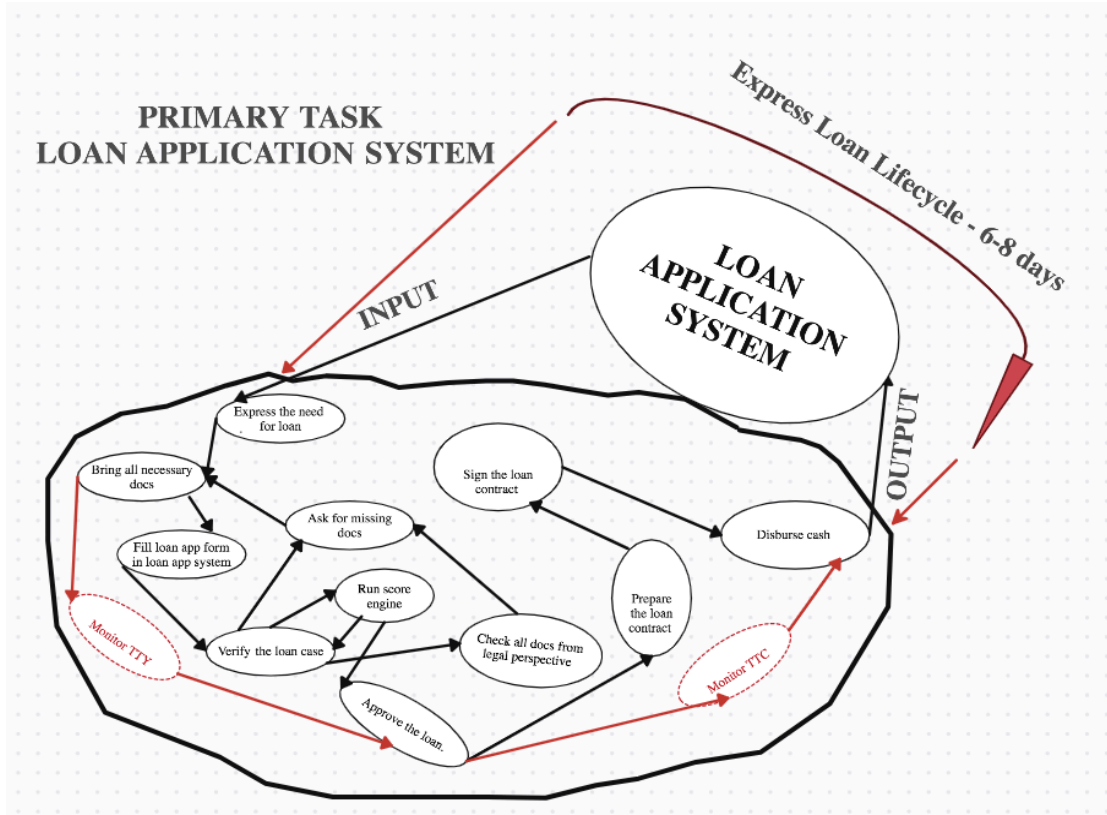
The main activities identified by the researcher to build the conceptual model and fulfilling the triple Es criteria were:

- 1-) Express the need for an Express loan.
- 2-) Bring and submit all necessary docs for the loan.
- 3-) Open the case in system or fill the application form
- 4-) Verify the case
- 5-) Ask for missing docs, if there were any
- 6-) Run the scoring engine

- 7-) Approve the loan
- 8-) Prepare the loan contract
- 9-) Sign the loan contract
- 10-) Disburse the loan

Figure 24

Primary Task Conceptual Model Case -1



(Islamaj, 2021)

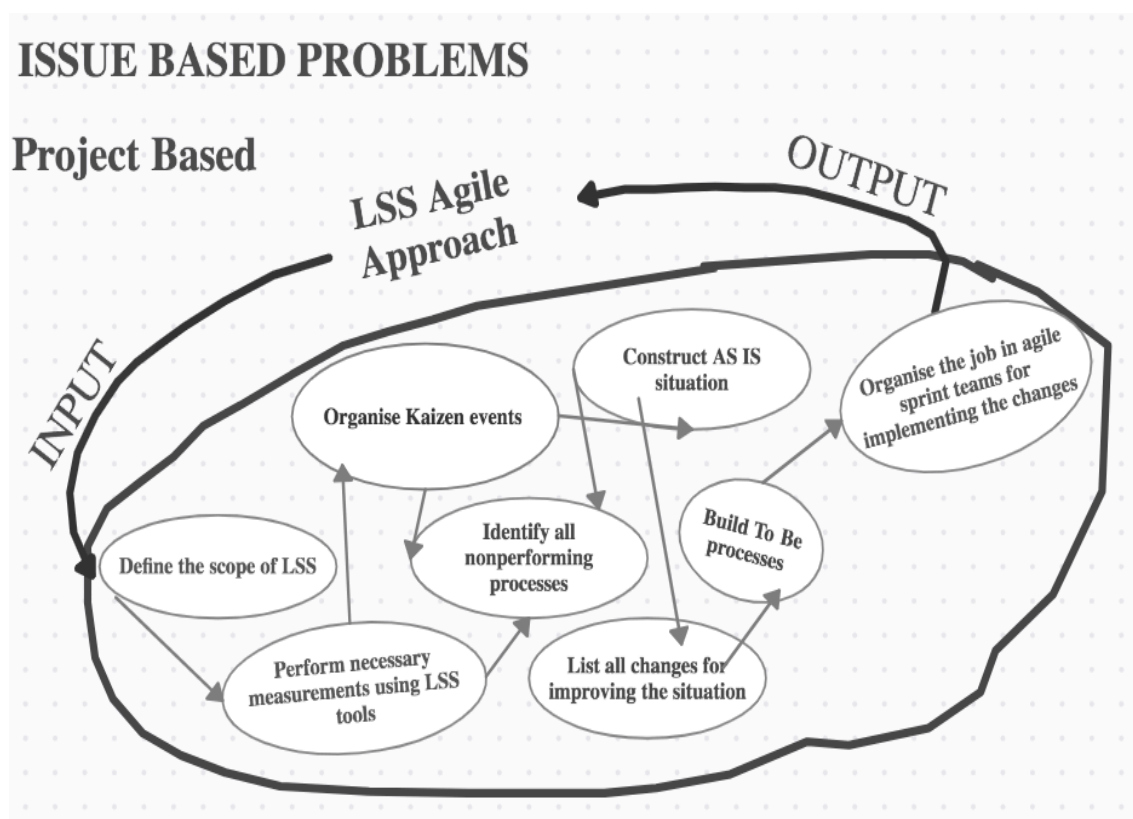
The researcher identified the internal and external feedback loops (Gasson, 2021b) and placed them in the conceptual model using red lines. As a main external feedback loop, the researcher identified express loan lifecycle, which was between 6-8 days in the current research. The researcher identified two leading indicators for internal feedback loops: Time to Yes (TTY) and Time To Cash (TTC). These indicators played a significant role in the debate and take-action sections since all the changes proposed had to be validated against these indicators.

7.1.3.3 Issue Based Conceptual Model

Following RD for the Issue-Based, the researcher built the respective conceptual model. For the current case, the researcher concluded that the Issue-based system was a system to solve the problem' or 'system to undertake a project' (Wilson and Van Haperen, 2015, p 41.) that transforms the changes identifies during the LSS project and implement them (Figure 25) relatively in a short time.

Figure 25

Issues Based Conceptual Model Case -1



(Islamaj, 2021)

The researcher applied triple Es for the issue-based system as well.

Efficacy —All activities included in the conceptual model should represent the transformation. In the current research and agile version of LSS or any stand-alone agile framework that deals with findings from any LSS project and implements them in practice. Activities included in the conceptual model are all activities carried by actors, including IT, that will implement them (see limitation section for more information).

Efficiency — researcher used minimum resources to obtain the output of the transformation.

Effectiveness— Activities included in the conceptual do meet the organization's long-term goals by ensuring no gaps among activities for implementing the changes in the system.

As shown in Figure 25, the conceptual model shows all activities conducted by actors to identify changes, minimum activities are included, and the system proposed ensures continuity and consistency for the organization's long-term goals. The main activities to carry out a proper issue-based model were:

- 1-) Identify the scope of LSS
- 2-) Perform the necessary measurements using LSS tools
- 3-) Organize Kaizen events with main stakeholders
- 4-) Build AS IS situation
- 5-) Identify all non-performing well activities
- 6-) List all changes for improvements
- 7-) Build TO BE situation
- 8-) Organize the job in agile sprint teams to implement the changes.

And to validate the purposeful issue-based activity, the external feedback loop used is the rate of changes identified/implemented.

7.1.4 Debate and Action

During these stages, the researcher used the information obtained in the rich picture and conceptual models to organize the discussion about potential improvements. The researcher used a dialogical mode with all participants and used conceptual models to start the debate for improving the situation. This debate aimed not to improve the models but to accommodate the perspectives and interests among stakeholders (Lockett and Grossenbacher, 2003). In interrogating the conceptual model, the researcher noticed

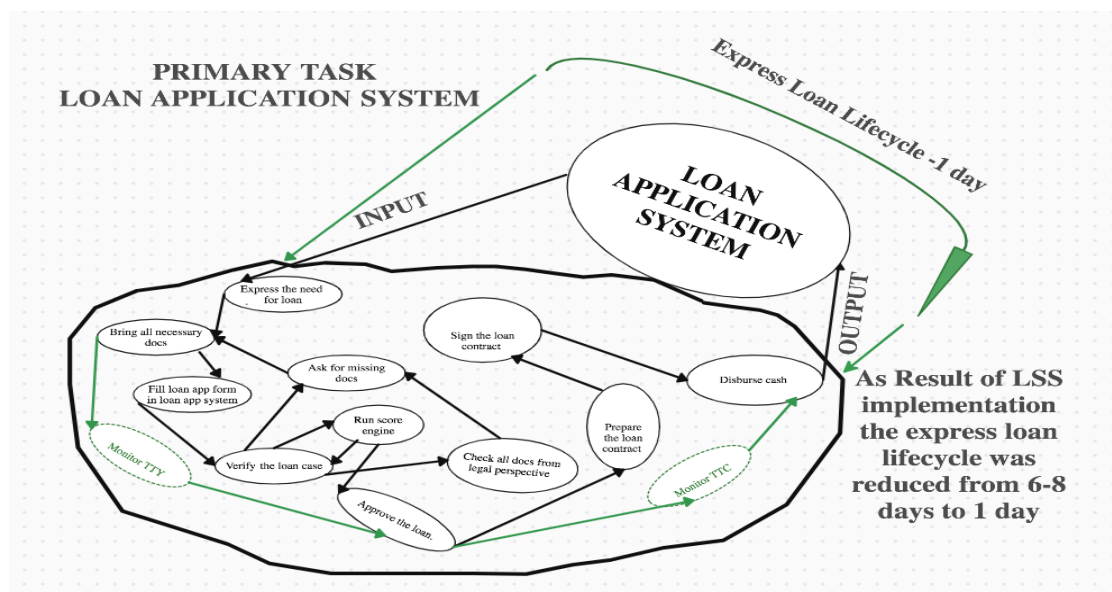
that the risk team had a critical role in the entire express loan process... *problematic was the first part I mean starting from the application of forms completion of file, getting approval from risk (C1P1a) causing some kind of repetitions and back and forth among these roles... from risk to the branches for the completion of some documents, and they were complaining with each other (C1P2), while other activities like... the disbursement process it was ok (C1P1a).*

The researcher understood that these delays were identified during Kaizen week...*we have, AS IS process duration before implementation of Lean Sigma was from six to eight working days (Figure 24) (C1P4).*

Participants suggested that the current process needed to be improved and this can be achieved... *eliminate the communication between branches and risk due to delays (C1P1a)...the risk stage needs to be removed (C1P3) and for small amounts ...they did not have to approve the loan (C1P4).* However, they acknowledged the importance of moving risk for small amounts can pose the risks for bad loans but ensured controlling process that mitigate it successfully. Based on rich discussions among stakeholders the most convenient way to address the current concerns was...*the credit scoring tool was decided to be completed in the branches (C1P2).*

Figure 26

Primary Task Conceptual Model Case -1



The researcher asserted that a new way of working was associated with other controlling measures to avoid depreciation of the quality of express loan products. The researcher checked the external feedback loop to see how the entire loan lifecycle changed and emerged that...*after implementation for files approved within the branch, it takes one working day. So the application and the disbursement in express loan cases is done within one working day* (C1P4) (Figure 26).

The researcher continued to explore other improvements apart from removing the scoring tool from risk to branch people and identified many other improvements such as reduced number of documents from customers, manual data analysis was directly imputed in the scoring tool. In contrast, when branch people run the scoring, the risk opinion will be printed automatically and approve the loan. Access of branch people to check the credit history of the customer was granted, something which was missing before. Overall, the researcher asserted that internal and external feedback loops were improved, and the controlling metrics were in place to continue with the same quality. Participants also noted top management's involvement and commitment as a key factor for successful implementations in case of improvements. They were very happy with LSS as a methodology that helped them identify the weak areas and make necessary improvements.

However, they were concerned about the *implementation phase should be improved* (C1P4) in LSS DMAIC framework...*we cannot wait to complete all the improvements or tasks of the action plans in order to go live, but we can go live for example by Sprints as it is Agile methodology* (C1P1a).

Based on all participants' worldviews, the researcher concluded that upgrading the current primary task of the express loan system to allow branch employees to use the scorecard to analyze and approve express loans significantly improved the express loan product. Also, the suggestions from participants to implement small changes without a lengthy approval ladder will boost the team's flexibility in front of the competition.

7.1.5 Limitations

The entire research process in case-1 was exciting, and the researcher had full cooperation from all participants, regardless of the covid-19 concerns. Despite the fact that the researcher missed the chance to organize workshops with participants (as a result of covid – 19) to go through SSM concepts such as rich picture, primary task, issues-based model, or conceptual models, the range and depth of data obtained was astonishing.

To some extent, the researcher would have preferred a larger circle of interviews with representatives from management and the IT division in particular. The first one was important since they were identified as business owners (O) in the CATWOE framework and had the political power to cease or boost any initiatives. In this context, the researcher missed the views from their side to weigh their opinions about the improvement phase of the DMAIC framework, which is taking more time than usual.

The researcher was also interested in hearing about their digitalization strategies and agile approaches and wanted to match where LSS stands in front of these initiatives. Furthermore, the researcher would have preferred to interview some IT people to have their opinion about findings that emerged in LSS projects. The researcher wanted to know their scale of involvement in LSS projects, how much time they needed to implement these changes, and most importantly, how they see the future of LSS in the light of rapid financial services changes resulting from digitalization.

7.1.6 Reflections

This research that applied the traditional qualitative method of SSM enabled the researcher to bring forward various stakeholders' worldviews, perceptions, and understanding about LSS implementation in their organization. The first engagement of the methodology with stakeholders (Figure 23, rich picture) identified main roles, structures dealing with express loan products and revealed various issues about this product.

The initial stage of SSM showed the underlying reasons as well why and when LSS was triggered to start. While the main reason for starting the LSS project was customer complaints, there were cases when management decided to do so independently. The study leveraged the value of main SSM tools (rich picture, root definitions, CATWOE, and conceptual models) by engaging participants and facilitating the debate. While the rich picture provided a high-level and unstructured understanding of the situation, the conceptual models presented a clearer view. They enabled the researcher to accommodate all participants' perceptions.

Root definition primary task, CATOWE, and triple Es facilitated the researcher to validate the conceptual model for building the common ground for debate on how to improve the situation. All suggestions for improvements were challenged using feedback loops to measure improvement's success and long-term validity. Another essential factor in this study was the development of issue-based problems. While all participants appreciated the KAIZEN events of LSS as one of the best tools they

experienced during LSS, they expressed concerns about implementing changes identified in their LSS project.

This led the researcher to develop the root definition issue-based. With the help of all participants, he concluded that case 1 organization needs a more flexible and agile approach in dealing with this issue. Although the limitations explained in the previous section for approaching stakeholders with the business and system ownership and the authority for implementing the improvements, this case study achieved its objectives in the intervention context. Social and political aspects were not part of the research due to the limitations mainly.

However, the researcher became aware that issue-based problem owners (business and system owners) are the key people to be contacted. SSM highlighted how to hear participants' perspectives in line with qualitative research. The research illustrated the importance of focusing on hard aspects as LSS does and softer aspects of participant perceptions. This research was precious by identifying and addressing the issues affecting different stakeholders during LSS in case 1; Furthermore, the holistic approach of SSM analyzed the problematic situation as a whole and avoided focusing on one group.

Case 2 – Bank

7.2.1 Introduction

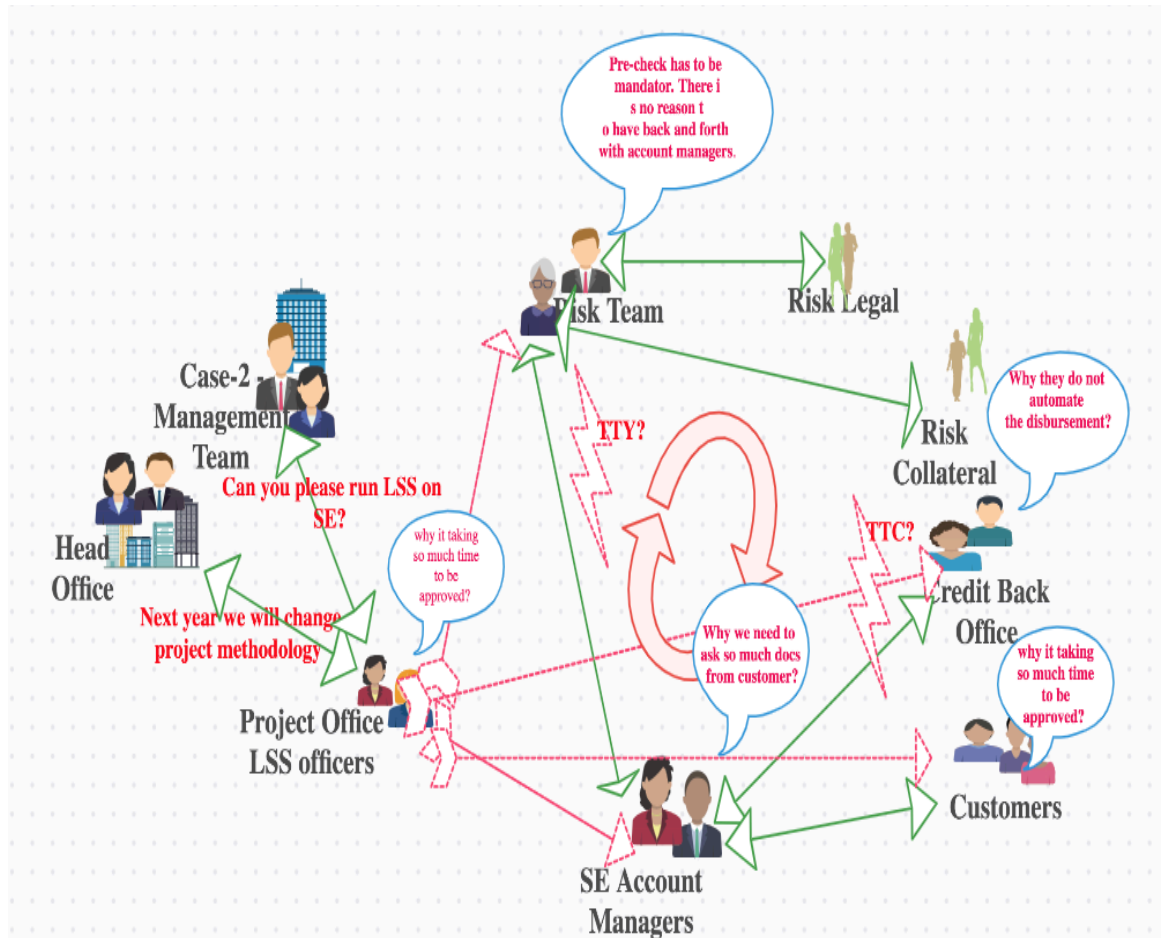
Case -2 Bank is part of a large European International bank with a long tradition and history in financial services. Their headquarters are positioned in Europe and have an extensive banking network across Central and Eastern Europe. They offer all kinds of banking services ranging from consumer banking, investment banking, and asset management products. The current research took place in one of its subsidiaries in the CEE region, explicitly in Albania, and analyzed the LSS project for lending in Small Enterprises (SE).

7.2.2 Perceiving and Expressing the Problematic Situation

“Learning from books is relatively easy, at least for those with an academic bent, but learning from experience is difficult for everyone. Everyday life develops in all of us trusted intellectual structures which to us seem good enough to make sense of our experiences, and in general we are reluctant to abandon or modify them even when new experience implies that they are shaky”

Figure 27

Rich Picture Case - 2



(Islamaj, 2021)

...and when it comes to learning from other experiences is even more difficult presumably unless there is a structure in place. The placement of participants' stories and experiences is purposeful, with each area representing key patterns that emerged from the data (Conte and Davidson, 2020). Therefore, the researcher started his research in case -2 by firstly identifying key people, structures, roles, conflicts, or any issues that participants were facing in day-to-day activities of the lending process for small enterprises (SE).

The researcher presented his initial understandings of interactions among all participants in rich picture drawing Figure 27). He used people icons to show the main roles involved in the lending process for SE in case – 2. Green lines with double-headed arrows connecting people icons show the day-to-day communication and their

relationships. They also explain how the customer could request lending in SE flows in case - 2 by contacting the account managers. After some preliminary checks, the only contact point is account managers, who divert their request to the risk people for further qualitative, collateral, and legal analysis. They also maintain relationships with the credit back-office team, which disburses the loan requests.

The left side of the picture is a project team represented by LSS officers who have direct communication channels with head office and the current management team. They usually define the priorities for the project office team on which methodology to use or which process to measure and intervene to improve. With red dotted lines are processes initiated by LSS officers for measuring the critical parts of the lending product in SE. In this context, lighting bolts with red colors and descriptions Time to Yes (TTY) and Time to Cash (TTC) are very concern for the LSS officers. They indicate high values compared with acceptable levels from the organization. There is a loop in the center of the picture, which informs the reader that something is going on, back and forth among risk and account manager roles regarding customer loan requests. Also, the thinking bulbs alongside each role express some of the concerns that people in various positions face in their daily operation, validating the main KPIs of TTY & TTC measured by LSS officers. In the next section, the researcher will formulate purposeful activity models and use the information obtained in the current stage to build CATWOE elements and proceed with root definitions.

7.2.3 Modeling- Formulating Purposeful Activity Models (PAMs)

7.2.3.1 CATWOE – Root Definitions

Following the perceived the situation for SE lending process in the case – 2 Bank, the researcher asserted that the main elements of CATWOE are:

C (Customers benefiting from activities in the system): Bank Customers applying for loans.

A (Actors performing activities in the system): SE Account Managers, Risk Team (Risk and legal) and Credit Back Office team.

T (Transformation process): Transforming customer loan requests into loan disbursement

W (Worldview or Weltanschauung of the system's existence): Customer loan request

should be delivered in acceptable time for the customers and the bank. Use LSS project to measure and ensure that the transformation system meet their demands.

O (Owners of the system): Case 2 Bank's Management team

E (Environment's constraints): Budget, competition, fintechs, and regulations.

As Wilson and Van Haperen (2015, p. 21) noted that a root definition is a single sentence that captures the essence of the specific situation, the researcher used T and W to identify the primary task and enrich the root definitions (RD) with other elements of CATWOE:

RD1 – Primary Task:

A bank's management teams owned system, operated by account managers, risk and credit back-office employees to enable consistent delivery of SE loan products following LSS continuous improvement approach to ensure the SE loans are disbursed in the acceptable time and quality for customers and bank management team within the constraints of budget, completion and regulations.

The researcher used the QPR formula 'Do P by Q to contribute to achieving R,' for validating the process of RD primary task (Checkland and Poulter, 2006) as following: To deal with customer's loan requests (P) using/ submitted in the loan application system (Q) to disburse customer's loan request (R).

In discussions with participants to understand the situation, the researcher learned about concerns and challenges that they were facing for implementing the changes identified during LSS projects.

The researcher marked them as issue-based problems since their existence impacted the primary task not to work well; they were temporary. If actions were taken immediately, they would cease to exist (Wilson and Van Haperen, 2015). In the current research, the main concern from participants was that improvements identified during the LSS project are taking a longer time to implement and, in some cases, are not implemented at all. The researcher understands that the new CATWOE should have been prepared for the issue-based problem. Anyway, this is not mandatory, and RD can be produced and used as a reference (Wilson and Van Haperen, 2015, p.39) for conceptual models.

Also, due to limitations on field research, the researcher prepared RD2 for the issue-based problem using participants' worldviews and the primary transformation process to transform the changes identified in implemented changes.

RD2 – Issue Based:

A Bank's management team process or group of processes, operated by bank's employees, to identify and implement IT changes emerged during LSS project by undertaking a derivation of information in affected areas, which can satisfy business requirements, using Agile methodology but constraint in time, budgeting and training arising from it.

The researcher used again QPR formula 'Do P by Q to contribute to achieving R,' for validating the process of RD issue-based (Checkland and Poulter, 2006) as following: To deal with changes identified during the LSS project (P) using Agile approach and Agile teams (Q) to implement them (R).

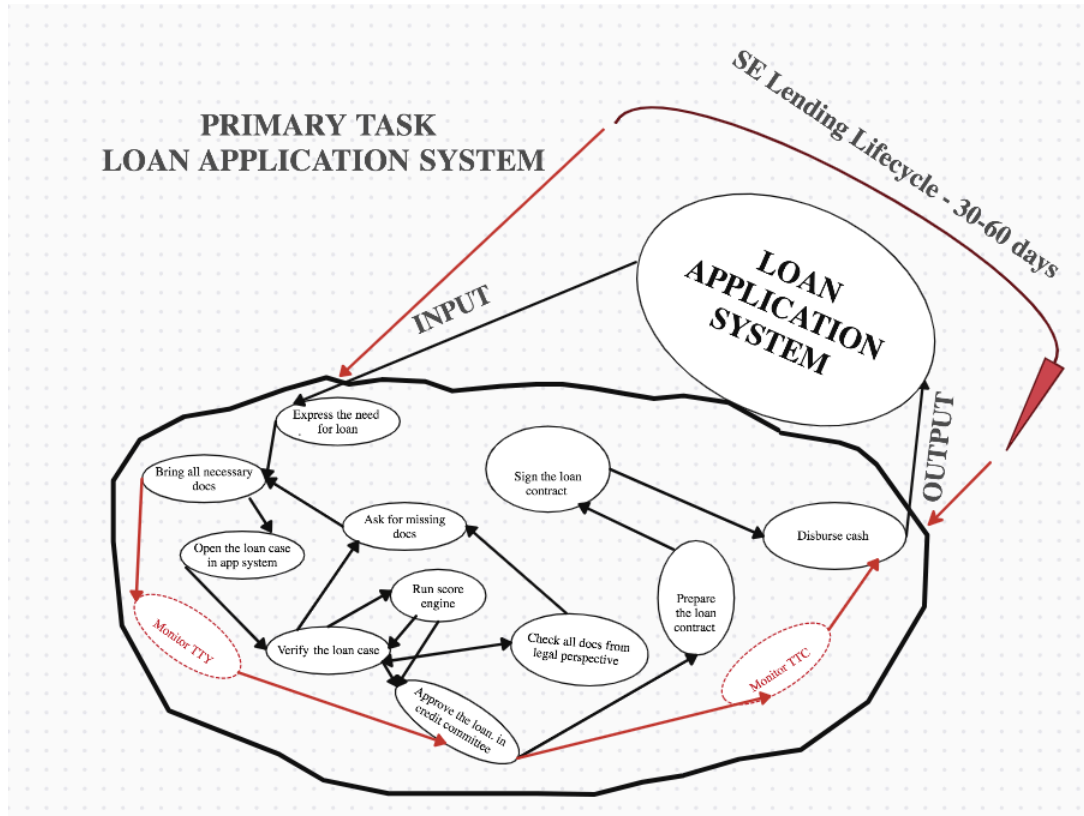
The researcher formulated the conceptual models for purposeful activities identified in the case – 2 Bank in the following sections.

7.2.3.2 Primary Task Conceptual Model

CATWOE elements and RD for the primary task formulated in the previous section helped the researcher build the concept of purposeful activities of the primary task for the case – 2 Bank (Figure 28).

Figure 28

Conceptual Model Primary Task Case -2



(Islamaj, 2021)

Checkland and Poulter (2006) suggested that the researcher used the triple Es approach to evaluate the purposeful activities in the conceptual model primary task.

Efficacy —All activities included in the conceptual model should represent the transformation. In current research is a loan application system that transforms customer loan requests in loan disbursement as output. These are the activities carried out by main actors identified in CATOWE or victims and beneficiaries if the primary task fails. In the current research, victims/ beneficiaries were customers and actors who access and use the loan application system daily.

Efficiency — researcher used minimum resources to obtain the output of the transformation.

Effectiveness— Activities included in the conceptual do meet the organization's long-term goals by ensuring no gaps among activities for the end-to-end cycle and consistency in delivering the loan requests.

For building the conceptual model, the researcher used the Checkland (1990) suggestion in aiming 7 ± 2 activities per conceptual model where each activity starts with a verb in imperative or command form. The arrows show the logical dependencies from one activity to another, meaning that some outputs or sub-processes from previous activities need to be completed for starting the other activity.

The main activities identified by the researcher to build the conceptual model and fulfilling the triple Es criteria were:

- 1-) Express the need for a SE loan.
- 2-) Bring all necessary docs.
- 3-) Open the case in system or fill the application form
- 4-) Verify the case
- 5-) Ask for missing docs, if there were any
- 6-) Run the scoring engine
- 7-) Approve the loan in credit committee
- 8-) Prepare the loan contract
- 9-) Sign the loan contract
- 10-) Disburse the loan

The researcher identified the internal and external feedback loops (Gasson, 2021b) and placed them in a conceptual model primary task in case -2 using red color lines. As a main external feedback loop, the researcher identified SE lending lifecycle *...as the whole process was about 30 - 60 days (C2P4)*. The researcher identified two main indicators for internal feedback loops: Time to Yes (TTY) and Time To Cash (TTC). The feedback loops were the most important indicators used by the researcher to

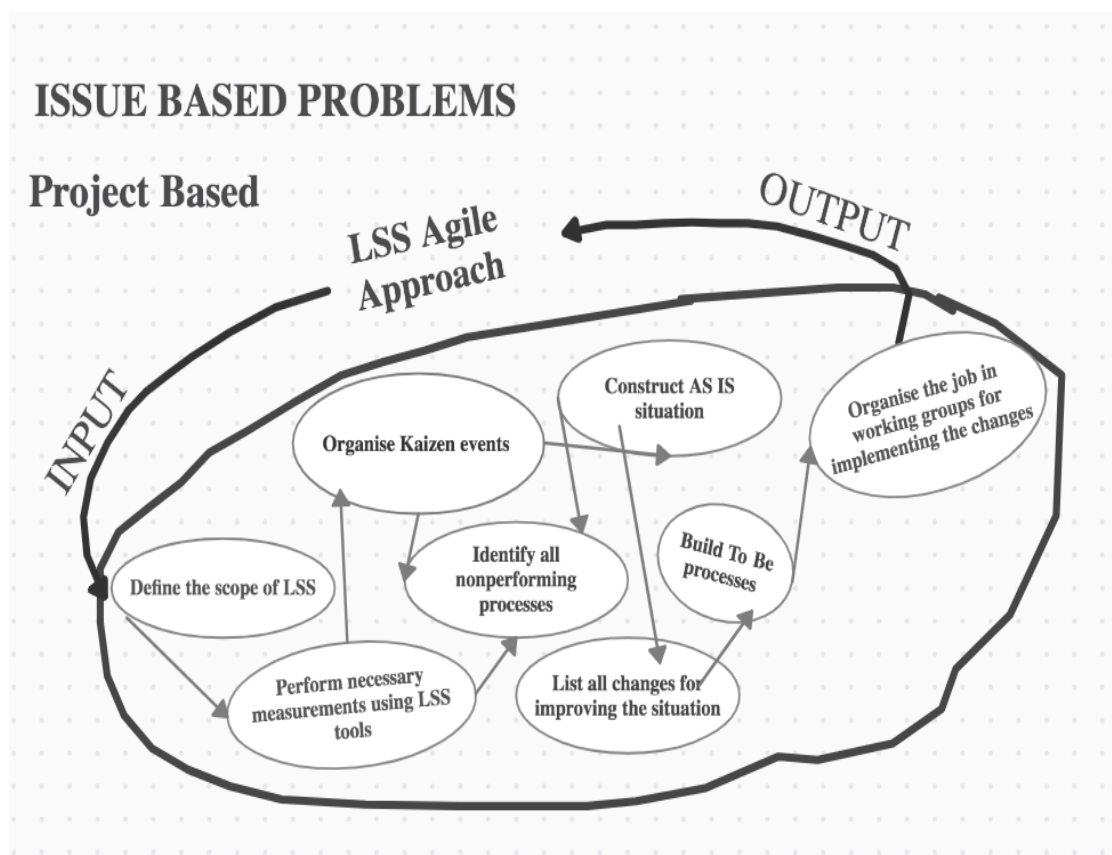
accommodate the participant's worldviews for taking action to change and measure their success.

7.2.3.3 Issue Based Conceptual Model

The same approach used for building the conceptual model primary task was applied by the researcher to build the conceptual model issue-based (Figure 29). Triple Es criteria were applied for validation of conceptual model issue-based

Figure 29

Conceptual Model Issue Based Case -2



(Islamaj, 2021)

Efficacy —All activities included in the conceptual model should represent the transformation. In the current research and agile version of LSS or any stand-alone agile framework that deals with findings from any LSS project and implements them in practice. Activities included in the conceptual model are all actions carried by actors, including IT, that will implement them (see limitation section for more information).

Efficiency — researcher used minimum resources to obtain the output of the transformation.

Effectiveness— Activities included in the conceptual do meet the organization's long-term goals by ensuring no gaps among activities for implementing the changes in the system.

The main activities to carry out a proper issue-based model were:

- 1-) Identify the scope of LSS
- 2-) Perform the necessary measurements using LSS tools
- 3-) Organize Kaizen events with main stakeholders
- 4-) Build AS IS situation
- 5-) Identify all non-performing well activities
- 6-) List all changes for improvements
- 7-) Build TO BE situation
- 8-) Organize the job in working groups to implement the changes.

As external loop for validating the conceptual models issue based in the current case was suggested by the researcher the rate of changes identified over the changes implemented.

7.2.4 Debate and Action

The researcher returned to the real world following his new understanding of reality from the conceptual models. He initiated the discussions with participants to identify problem areas to accommodate changes for improving the situation. In this context, some participants noted that:

“The first thing we wanted to eliminate was manual work...so for the products that require collateral, this is that we have more delays or more waiting times created customers or third parties like mortgage offices”

(C2P1a)

“documentation...the same things the docs the sale done one check, after that we have done another second check after that and then third check for the same things...and some gaps in the application system”

(C2P2)

“it was submission of mandatory legal documents”

(C2P3)

“loan application should become more user friendly in order to response faster the request and to help any department working independently, to start any step of app independently in each phase you are”

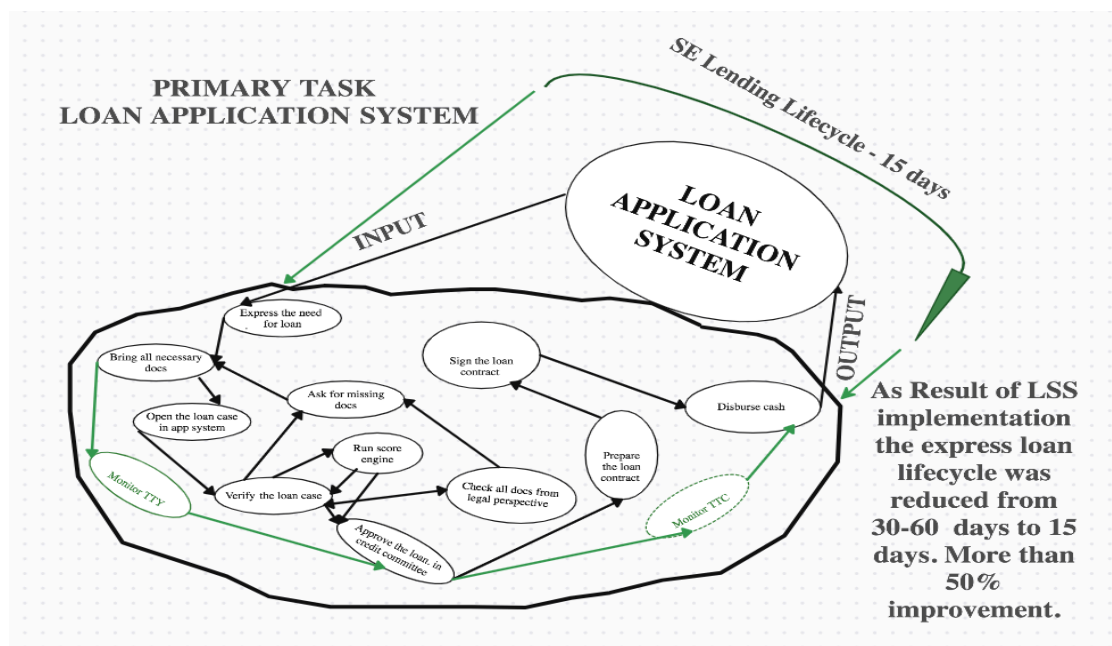
(C2P4)

“analysis process is very hard because the current system it was not providing enough data for analysis”

(C2P1b)

Figure 30

Conceptual Model Primary Task Case -2



(Islamaj, 2021)

The researcher understood that the main loop shown in the rich picture was between risk and account managers. Loan customer documents generated the most delay. Some documents were missing, some were multiple checked from different roles, and the following up process was causing back and forth among participants, which ultimately was translated as the main cause of the delay in the SE loan application lifecycle. The existing Loan application did not adequately meet their internal analysis demands and faster response to the customers either. The researcher asserted from participants' discussions that the best way to mitigate current problems was upgrading the existing SE loan application system. However, to measure the upgrade's success and match it towards internal and external feedback loops, the researcher identified some of the processes that have to be included in the upgrade.

“Everyone is now aware that no case shall be submitted ... without primary of mandatory docs” (C2P3).

“... eliminate the loan admin because I think disbursement will be automatic process” (C2P5).

“Customer rated very good would directly to apps, mostly renewals and benefit shorter underwriting process, while new customer has longer time... but customer with good rate and history goes with smooth approval steps.” (C2P4)

Reaching an agreement with participants on what documents should be submitted from the customer and not starting the analysis without mandatory documents would become a great relief for the case -2 bank since it will reduce the output of many docs. The new system should be included the standardization of conditions approval authorities to avoid back and forth among different roles. Also, the new system should facilitate all the information needed for the participants to perform their necessary quantitative analysis to reduce communication logs and q&a among roles for a particular case. Customer rated very well will go directly for approval and benefiting a shorter underwriting process.

All these actions are directly related to Time to Yes (TTY) (Figure 30). Automating the disbursement will immediately impact the other internal feedback loop of Time to Cash

(TTC). Improving those will improve the whole loan lifecycle. As a result of changes, the entire loan lifecycle was improved to 15 days (Figure 30). The researcher is also aware that loans in small and medium enterprises are difficult to have a life of one day since the amount approved exceeds mil euro. Cautious must be high all the time regardless of technology improvements.

The researcher asserted that upgrading the current system, including some of the features mentioned above, is the best way to improve the existing situation. All participants were delighted with LSS as a methodology and, in particular, the Kaizen events. However, they noted that the main challenge in LSS is the implementation/improvement part of DMAIC since it takes time. They all suggested an agile approach as a very flexible approach for implementing changes to avoid wasting time going through long approval steps.

In the next section, the researcher will present some of the limitations he faced during the case - 2 study.

7.2.5 Limitations

The complete LSS evaluation in case -2 was an excellent learning experience, and the researcher had frank communication and full cooperation from all participants. The researcher would have preferred to have workshops or extend his interviews to explain all SSM tools like the rich picture, primary task, issues-based model, or conceptual models.

Perhaps some interviewees from head office who prepare the strategies on which methodology a particular network bank should use would have benefited the research to understand their perspective on LSS as a methodology.

Also, a discussion with the current management team since they hold power to go or not to go with any LSS project would have brought additional insights into the current and future LSS methodology. The researcher missed some interviews with IT people to understand their role and involvement in this project. They are the key stakeholders and system owners for implementing the changes identified in any LSS project. In particular, the researcher was interested in knowing the scale of their involvement and the relationships with the project office as two different entities in the organization.

Their input in how they see LSS in light of the rapid financial changes landscape would have been necessary for the research. Most importantly, their feedback would have been important in clarifying the suggestion for better synergy in applying changes. In

particular, the suggestion for more cooperation between agile and LSS teams for quicker implementation.

7.2.6 Reflections

Rather than hunting for root causes to fix the problem SSM offers a refreshing alternative in problem evaluation tools by using logic to define what “good” look like and move towards it (Burge, 2015). While trying to make sense and perceive the situation in case -2, the researcher learned that the main stakeholders in the lending process for small and medium enterprises (SE) were account managers from the sales department, risk team dealing with, collateral, and legal analysis for a particular loan. The request for employing LSS in this process was initiated by management to streamline the lending product in SE and improve the customer service. The project office team within the organization deployed the LSS methodology for this assignment.

They usually sit as a central point for managing all projects in organizations using different project methodologies, while technical directives on which methodology to use mostly came from head office (as shown in the rich picture, figure 27). Issues identified in the first stage were related to the main indicators of TTY and TTC, showing that approval and disbursing time in the current product weren't meeting organization goals. To accommodate the participant's worldviews, the researcher built the respective root definitions and conceptual models.

Prior to doing that, the researcher built the CATWOE framework, where T and W were the bases of RD, whereas other elements were used to enrich it. While the primary task or the essence of the process under investigation was transforming customer loan requests into loan disbursements, the development of issues-based problems that may affect the primary task to not perform well was also developed. Upgrade of the existing loan application system (primary task) with clear technical requirements and objectives was considered the best way to improve the current lending service to meet organization and customer goals.

Kaizen events with MIFA and SIPOC were the main tools applied from the LSS perspective and were appreciated a lot by participants. Commitment from top management was considered the key to the success of LSS and, in this case, was regarded to support and implement faster the improvements identified in LSS projects. Hence, the researcher developed the issue-based problem conceptual model using an

agile approach of LSS that explicitly tackles that challenge and offers a path on how to deal with it. They all acknowledged the role of Top Management as the main factor in the success of LSS, and using its tools empowered them in working and thinking independently. The researcher identified and presented some limitations in the current case study, which were related to additional views from business and system owners of the primary task.

Case 3 – Shared Service Center (SSC)

7.3.1 Introduction

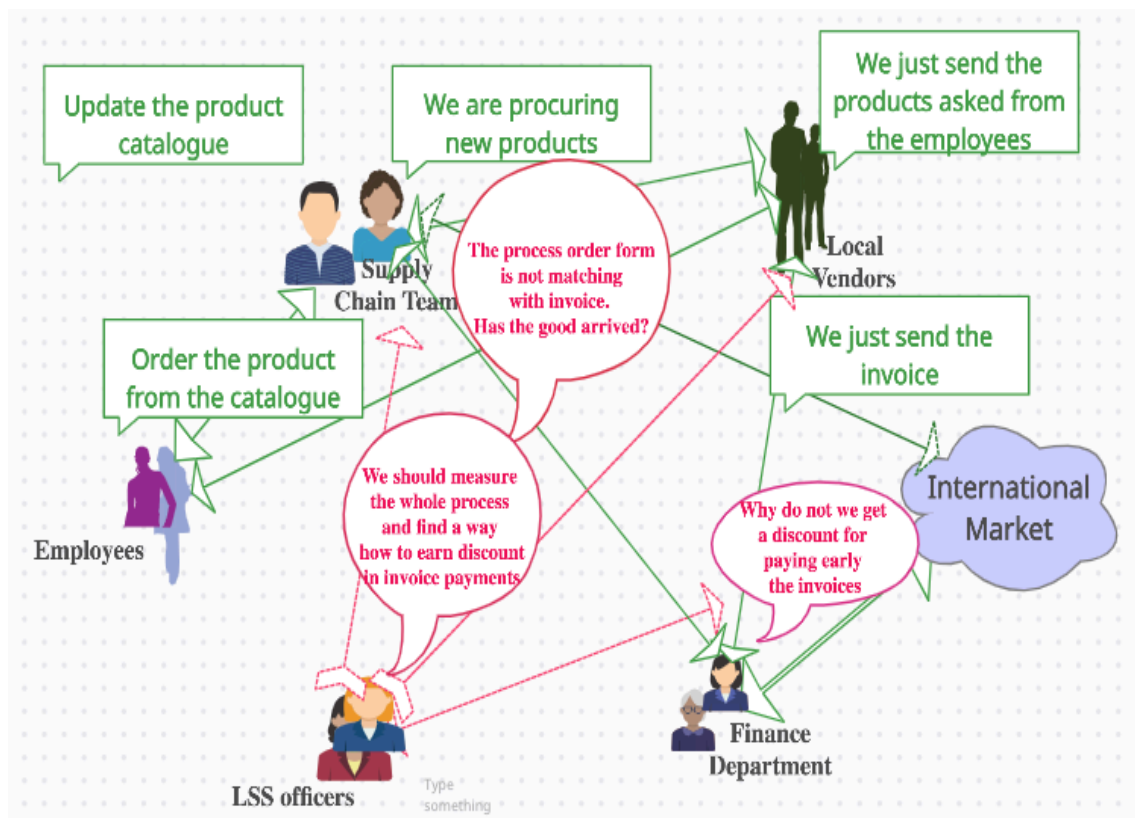
Case -3 Shared Service Center is part of a large International UK Corporation providing all financial, logistic, and human resources services for the employees of its company and the local market where it is located. Shared Service Center included in the current case study is situated in Asia, explicitly in India and the process under evaluation is procure- to- pay. In the procure-to-pay process, organizations integrate purchasing and account payable systems to improve efficiency. Main functions in typical procure-to-pay activity are selecting goods and services, prepared the order, receive the goods and reconcile, invoice and pay. The current research focuses on the early payment discount process, which was very important for the organization.

7.3.2 Perceiving and Expressing the Problematic Situation

In the real world, problems are neither straightforward nor inseparable from different situations, and many complex problems can't be solved using the orthodoxy of hard methods. For instance, there could be cases where answers to "what is the problem?" are unknown, and most of the critical part of the researcher analysis is to find out what the real problem is (Ghosh et al., 2016). The researcher started his investigation in case -3 by identifying key people, processes, structures, or issues concerning the stakeholders in their daily activities (Figure 31).

Figure 31

Rich Picture Case -3



(Islamaj, 2021)

In people, silhouette and icons are main the roles involved in the early discount initiative. Green double-headed arrows show the relationships amongst functions in the structure context, while rectangles callouts attached in each position give some samples from the daily activities happening in the invoice payment process. The general idea of the researcher to represent bubble thoughts in red colors was not to suggest a problem that something was not working correctly or was wrong but to distinguish from the regular operation. For instance, the finance department stakeholder suggested that the organization can financially benefit if it pays the vendor's invoices earlier than anticipated. There were no issues, problems, or

delays in the current invoice payment system, and therefore the researcher didn't use any exclamations or concern signs. All invoices were paid according to the mutually signed contracts with third parties. However, there were some clauses in some contracts that if invoices were paid early, the organization could benefit if it exercised it. The role of the LSS team is to measure, analyze and take necessary improvement steps to improve the existing invoice processing for an organization to gain from the early discount feature. In the next section, the researcher will formulate purposeful activity models and use the information obtained in the current stage to build CATWOE, root definition, and conceptual model

7.3.3 Modelling - Formulating Purposeful Activity Models (PAM)

7.3.3.1 CATWOE – Root Definitions

In expressing the perceived situation for invoice processing in case -3, the researcher asserted that the main elements of CATWOE were:

C (Customers benefiting from activities in the system): Local market, vendors. Third parties

A (Actors performing activities in the system): Finance Operation Team. Supply Chain Team

T (Transformation process): Transforming early received invoices into paid discounted invoices

W (Worldview or Weltanschauung of the system's existence): Invoices received from local vendors, or third parties should be paid earlier to benefit from the early discount feature. Use LSS methodology to measure and ensure that the transformation system meets the organization's demands.

O (Owners of the system): Case -3 Management team, Head of finance

E (Environment's constraints): Procurement regulations, Payment regulations.

Following T and W and other elements of CATWOE the researcher prepared the root definition primary task for the case – 3 study.

RD1- Primary Task:

“A finance management teams owned system, operated by financial specialists and

supply chain specialists to enable consistent invoice's third-party payments following LSS continuous improvement approach to ensure invoices are paid earlier than anticipated to gain and credit the discount within the constraints of procurement and payments regulations.”

The researcher used the QPR formula 'Do P by Q to contribute to achieving R,' for validating the process of RD primary task (Checkland and Poulter, 2006) as following: To deal with third-party invoices (P) using the invoicing payment system (Q) to pay third party invoices early and profit discounts (R).

The researcher tried to underpin some of the issue-based problems but couldn't find enough ground to build them. For instance, in the current case, one of the issue-based problems could be the motivation of people directly involved in invoice processing that could impact the primary task performance of the invoice payment system not to work well. Both sides (organization and vendors) should have incentives to motivate them to send the invoices early and pay them earlier. The only identified incentive that can tackle the motivation identified by the researcher was increased profit from the discount and leveraging the money paid earlier from a third-party point of view. Intervening in the primary task and providing critical systems to achieve early discount was adequate to reach the case study objectives. In the following sections, the researcher formulated the conceptual models for primary task purposeful activities identified in case – 3.

7.3.3.2 Primary Task Conceptual Model

Following CATWOE and root definition primary task, the researcher developed the conceptual models (Figure 32). He kept the number of activities into 7 ± 2 numbers in total were used imperative verbs to represent them. The arrows show the logical dependencies from one activity to another, meaning that some outputs or sub-processes from previous actions need to be completed for starting the other activity. The main activities identified by the researcher to build the conceptual model were:

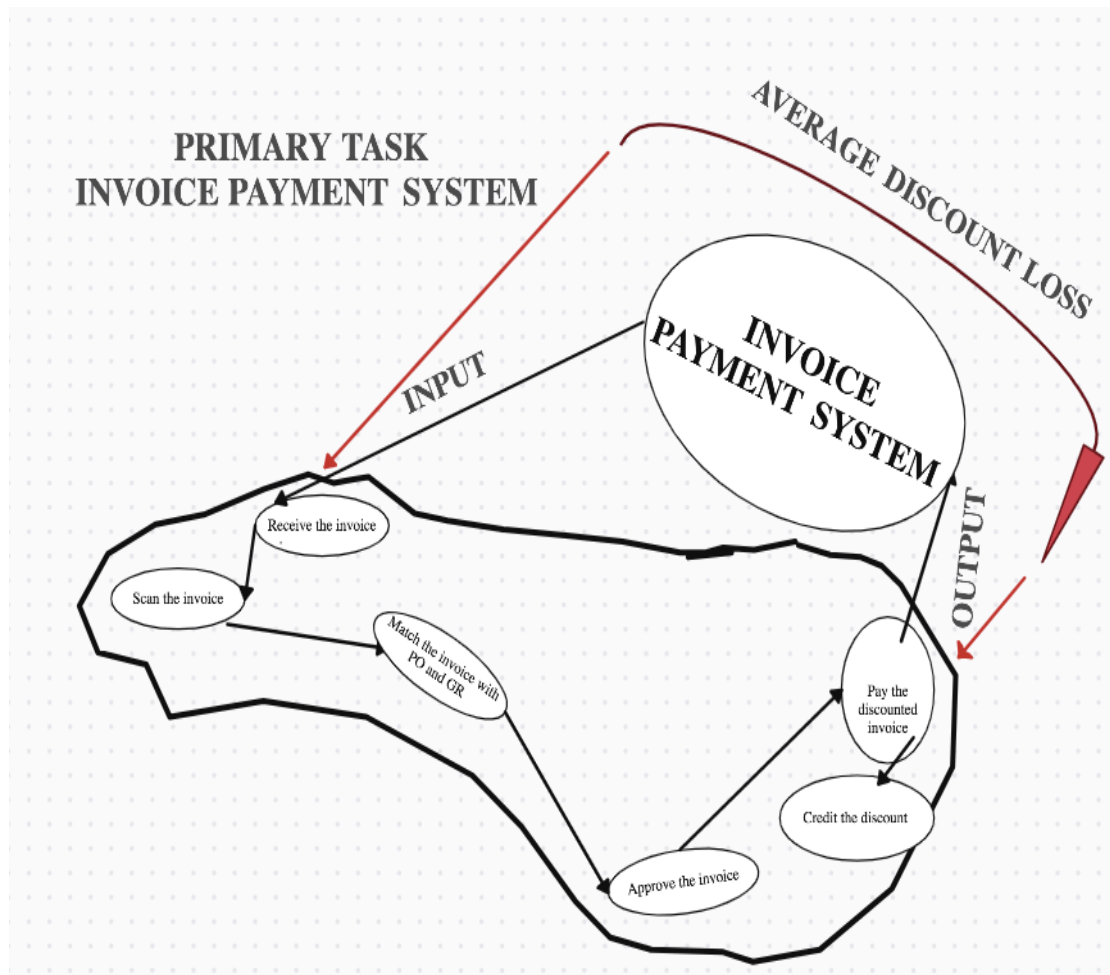
- 1-) Receive the invoice
- 2-) Automatically scan it
- 3-) Match it with Process Order (PO)
- 4-) Approve the invoice

5-) Pay the discounted invoice

6-) Credit the discount

Figure 32

Conceptual Model Primary Task Case -3



(Islamaj, 2021)

The researcher used the triple Es approach to validate the purposeful activities in the conceptual model primary task.

Efficacy —All activities included in the conceptual model should represent the transformation. In current research is an invoice payment system that transformed early received invoices into paid discount invoices as output. These are the activities carried out by main actors identified in CATOWE or victims and beneficiaries if the primary task fails. In the current research, victims/ beneficiaries were customers and actors who use the invoice payment system.

Efficiency — researcher used minimum resources to obtain the output of the transformation.

Effectiveness— Activities included in the conceptual model meet the organization's long-term goals by ensuring no gaps among activities for the end-to-end cycle and consistency in delivering a smooth invoice payment system.

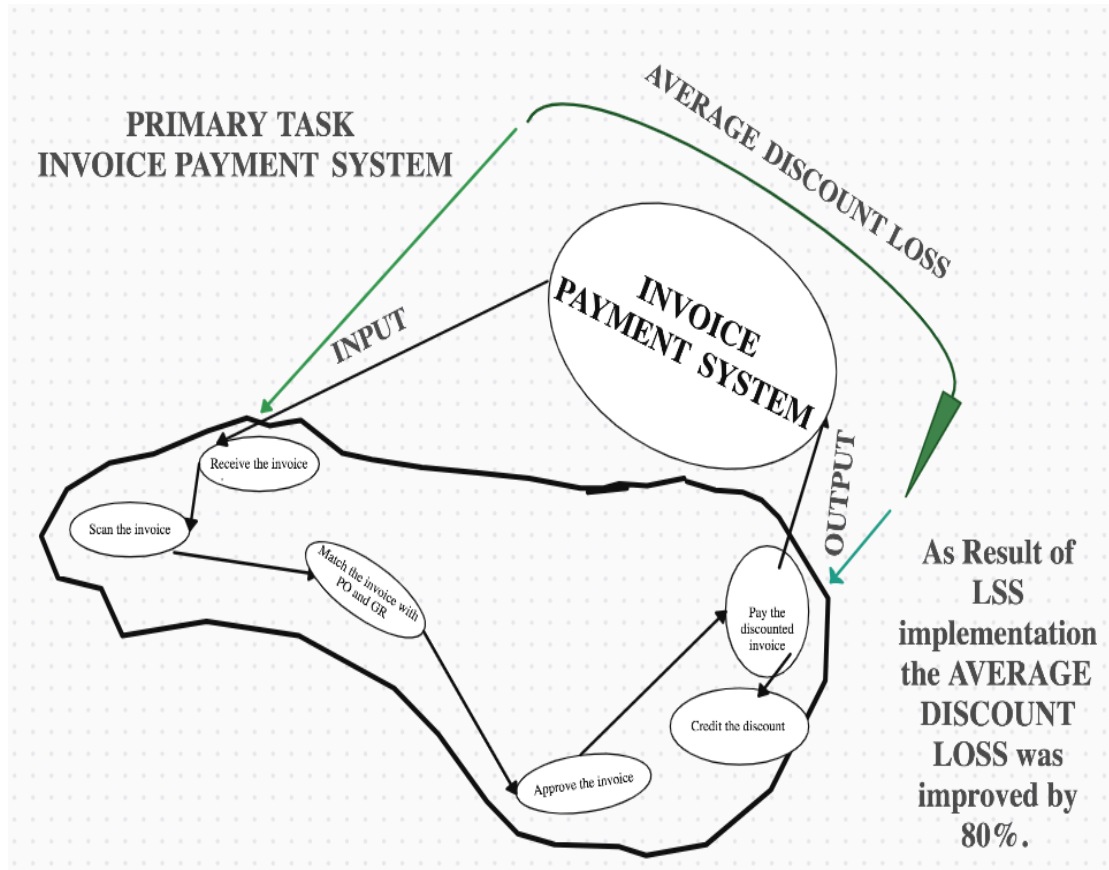
As an external loop researcher identified the loss or missing profit ...was average discount loss (C3P2) due to not applying the early discount feature and placed it in the conceptual model primary task (Gasson, 2021b) in red color lines.

7.3.4 Debate and Action

Thinking simultaneously, within the framework of the current situation, designing models for present and desired outcomes while judging the strength and weaknesses of alternatives provides a compelling application of inquiry-based research (Kawalek, 2008). Therefore, the researcher advanced his discussions with participants to accommodate the best possible option to bring the desired outcome for the case -3 organization. The incoming invoice volume showed a significant number of invoices qualifying for early discounts. Some criteria like Process Order (PO) for and Good Received (GR) should be matched with respective invoices to post the invoice earlier. Hence it was essential to identify the stopping signs or low-performance activities. As C3P2 noted...*so we did the chi square test for discrete data. So, we checked whether it was queries, which was a hindrance to us. And we came up with the fact that queries are indeed stopping us from making the posting on time.* Depending on who initiated the query, it would be easier to identify why responses were coming late and how to reduce them. Failing to address this issue caused... *invoices were put into block to that they are not processed further (C3P1).*

Figure 33

Conceptual Model Primary Task Case -3



(Islamaj, 2021)

The researcher asserted there was an immediate need to streamline the invoicing process since the incoming volume of invoices showed a substantial number qualifying for early discounts and tackling this activity could significantly reduce losses. Some of the actions suggested by the participants for streamlining the entire invoice processing were:

“Prioritizing all invoices with early discount feature and place them in different query”. As soon as invoices hit the case -3 organization *“use optical character reading (OCR) machines to automatically capture the invoice number”*. The changes in the current system *“should be system oriented not email oriented”*. All actions in the system should have *“a time stamp to track it and act quickly in mismatch cases”* *“when good received (GR), process order (PO) match with incoming prioritized invoice, proceed with payment”* *“if there is mismatch track it to through the appropriate channels and persons”*. (C3P1)

In this case, the most intuitive suggestion is to remove the manual work in every single step of the process. It requires a lot of commitment and coordination among all actors to complete the process successfully. The best motivation to keep the commitment high were:

- Tangible deliverables of primary task (invoice payment system).
- Improvements in profits.
- Reducing the manual work.
- Streamlining the whole invoice processing.

Hence the researcher deemed that developing an issue-based problem wasn't necessary. The researcher also matched all these actions for improvement against the external feedback loop (Figure 33). The results were stunning – an 80% reduction in financial loss due to appropriately implementing the early discounted feature in incoming invoices. There were some limitations in the current research, which will be shown in the next section, followed by the researcher's reflections for the case – 3 study.

7.3.5 Limitations

The researcher enjoyed the depth of inquiry in case – 3 and the richness of data provided by its participants. However, more participants could have provided other different insights, although the current interviewees were the core team members of the LSS project. Some views from Supply Chain Management, third parties, or local markets probably would have brought new dimensions to the discussions, but the researcher reckons it wouldn't change the final output of the research. The researcher would also have preferred some workshops or more time with participants to explain some of the critical concepts of SSM he used during the interviews but understands that logistically wise was hard to manage. Other interviews aimed to dig deeper into the issue-based problems that could impact LSS performance now and in the future.

7.3.6 Reflections

With the help of SSM, this research explored current practices of LSS implementation on improving invoice payment system in case -3 to benefit from early payment discount feature. In building the rich picture, the researcher revealed that the main actors in the early payment discount initiative were the finance department, supply chain management department, third parties, and the local market. Showing all these actors

was to find the synergies between case -3 organizations for streamlining the invoice payment services. LSS's team was involved...*because the impact of early payment discount was substantial (C3P2)*. Hence, LSS was triggered because the finance department saw an opportunity in the invoice payment process rather than told Management to do so. CATWOE and root definition guided the researcher in developing the conceptual model of purposeful activities for the early payment discount feature within the invoice payment process. The debate between system and real-world identified key processes to tackle to have an excellent early payment discount process. Numbers of activities were suggested for the case -3 organization to properly stream the core invoice payment process and mitigate previous problems. The researcher's external feedback loop to measure the success of actions suggested a recovered loss of 80% in the invoice payment activity. The Main LSS tools used were Fish Bone, Pareto, and Chi-Square analysis. The main reason for not using Kaizen events was the confidentiality of the project's financial data. The researcher didn't notice any issue-based problem even though for the primary task to perform well, a high motivation and dedication team is required. However, the outcomes of the primary task improvements were enough to encourage all parties involved to be consistent in using the new process. Participants acknowledged the improvement or implementation stage of DMAIC as a challenge in a wider context but not in the current project.

Fascinatedly, one of the participants noted that...*implementation is not a stagnant stage, right? It is something that needs to keep you that you need to keep working on. Because if you say, okay, I've implemented x, y Zed projects into my process, and now I can just sit and relax. It's not how it's going to work. Because if you have work, that means there's still something that you can improve that you can make better. Right. And I think that's something important for any project manager to understand that, yes, once you implement something, you still have to keep looking for why you're still doing a certain amount of manual work"*.

C3P2 C3P2 Suggesting that implementation shouldn't be blamed and biased since it is a continuous improvement process. In the case, -3 researchers understood that both LSS and Agile were widely used. There were strong indications to continue to do so in the future, because as C3P1 suggested, LSS is very good in process change management. At the same time, agile is very good in automation, indicating a resilient organization and a mature technological environment.

Case 4 – Fintech

7.4.1 Introduction

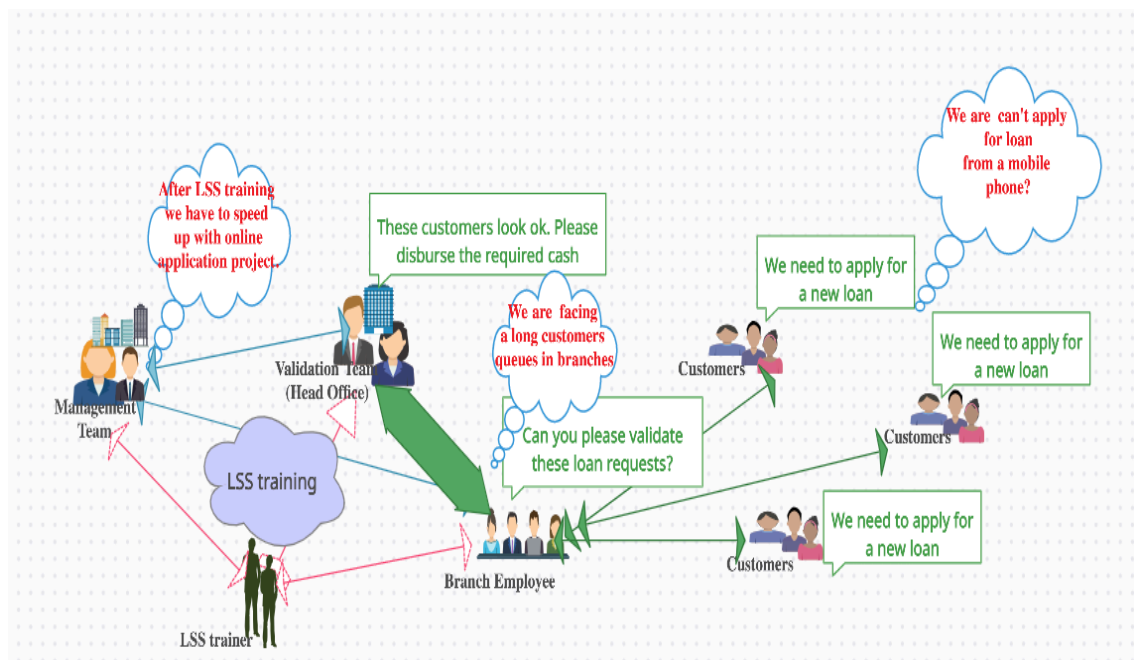
Case -4 Fintech is part of a European Fintech company providing financial services in the form of microloans. The events in the current research happened in its Albanian subsidiary. They entered Albania almost three years ago. According to banking regulations in the country, any financial service operating in Albanian territory needs to have a physical presence. In a very short period, they have been successfully being presented in almost all main cities. Fintech, in case -4, offers only one product called micro or consumer loan. This product must be quickly delivered, and regardless of customer employment status, their needs have to be addressed.

7.4.2 Perceiving and Expressing the Problematic Situation

Looking at the unstructured problem situation and expressing it in 'Rich Picture' are powerful steps to understand and comprehend the phenomena and events. They help to know where something is not working 'well' or needs to be done to 'improve' the problem situation Rodriguez-Ulloa, R., & Paucar-Caceres, A. (2005).

Figure 34

Rich Picture Case – 4



(Islamaj, 2021)

To evaluate the problematic situation as holistically as possible, the researcher treated the situation very openly and used the rich pictures to capture and express the reality he

experienced in the case - 4 research. The picture shows that the entire lending process happens between customer – branch people –validation teams (with bold lines). People icons are the main roles involved in the lending product, while the green double-headed arrows represent their relationships in the daily operational lives. Rectangle callouts represent some aspects of the lending process originating from customers and managed by the branch people. The researcher used bubble thoughts (Figure 34) with red texts next to each role to express new ideas, some aspect of the reality, or concerns that the participants in case - 4 were experiencing. Using red colors in double-headed arrows researcher wanted to emphasize some different activities compared with normal ones...for instance, LSS training in the organization. The rich picture doesn't indicate any high alert or concern in its attempts to capture the reality, and there weren't many roles or structures, which could increase the complexity of the situation. The information obtained in this section was used to build CATWOE and root definitions needed for the conceptual models in the following.

7.4.3 Modeling- Formulating Purposeful Activity Models (PAMs)

7.4.3.1 CATWOE – Root Definitions

In expressing the perceived situation for consumer loan products in case - 4, the researcher asserted that the main elements of CATWOE were:

C (Customers benefiting from activities in the system): Customers asking for the loan.

A (Actors performing activities in the system): Branch Employee, Validation Team in Head Office

T (Transformation process): Transforming loan requests in loan disbursed

W (Worldview or Weltanschauung of the system's existence): The organization's mission and vision are to provide a loan lifecycle of 15 min to its customers. LSS has to be leveraged to map the process and help the organization keep its promises to the clients.

O (Owners of the system): Case -4 Management team

E (Environment's constraints): Fintech regulation, Central Banking regulation.

Following T and W and other elements of CATWOE the researcher prepared the root

definition primary task for the case – 4 study.

RD1 – Primary Task:

“A fintech' management teams owned system operated by branch employees and validation team specialists to enable consistent delivery of lending products following the LSS improvement approach to ensure that loans are disbursed in an acceptable time and manner for the customers and management team. “

The researcher used the QPR formula 'Do P by Q to contribute to achieving R', for validating the process of RD primary task (Checkland and Poulter, 2006) as following: To deal with customer's loan requests (P) using the loan application system (Q) to disburse customer's loan request (R).

During discussions with participants, the researcher identified an issue-based problem. As Wilson and Von Haperen (2015) suggested, they are temporary and could cause the primary task not to perform well and not fall within the organization's boundaries. Also, they suggested (P.39) that RD for the issue-based problems is adequate, and sometimes preparing conceptual models might not need. RD must be fully comprehended. In this context, almost all participants agreed that training is something they wanted to pay attention and the skills they were seeking for the future of their organization were agile...understandable for a fintech approach.

Therefore, the researcher prepared RD2 for the issue-based problem using participant's worldviews:

RD2 – Issue-Based:

A fintech' management teams owned process or group of processes, operated by Fintech's employees, to identify and implement IT changes emerged during LSS project or any other project by undertaking a derivation of information in affected areas, which can satisfy business requirements, using Agile methodology but constraint in time, budgeting and training arising from it.

The researcher used again QPR formula 'Do P by Q to contribute to achieving R,' for validating validate the process of RD issue-based (Checkland and Poulter, 2006) as follows: To deal with changes identified during the LSS project or any other situation(P) using Agile approach (Q) to implement them (R) quickly.

In the following sections, the researcher formulated the conceptual model primary task for the purposeful activities identified in the case – 4 Fintech.

7.4.3.2 Primary Task Conceptual Model

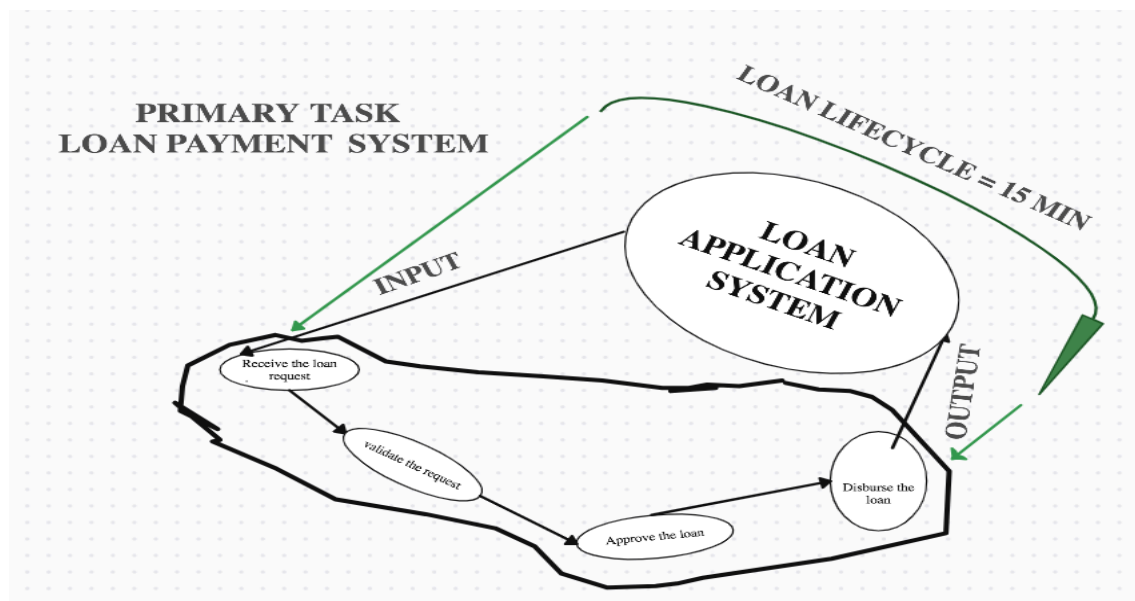
Following CATWOE and root definition primary task, the researcher developed the conceptual models (Figure 35). He kept the number of activities into 7 ± 2 numbers in total were used imperative verbs to represent them. The arrows show the logical dependencies from one activity to another, meaning that some outputs or sub-processes from previous actions need to be completed for starting the other activity. The main activities identified by the researcher to build the conceptual model were:

- 1-) Receive the loan request
- 2-) Validate the loan request
- 3-) Approve it
- 4-) Disburse the loan

The process was straightforward, short, and clear, as shown by bubbles and the arrows in figure 35.

Figure 35

Conceptual Model Primary Task Case -4



(Islamaj, 2021)

The researcher used the triple Es approach to validate the purposeful activities in the conceptual model primary task.

Efficacy —All activities included in the conceptual model should represent the transformation in the current research loan application system that transforms loan requests in loan disbursements. The activities are carried out by key beneficiaries and victims in the primary task. In the current case study, the victims/ beneficiaries were customers, and actors were branch employees and the validation teams.

Efficiency — researcher used minimum resources to obtain the output of the transformation. `Only four activities, the fewest possible number.

Effectiveness— Activities included in the conceptual model do meet the organization's long-term goals by ensuring no gaps among activities for the end-to-end cycle and consistency in delivering consistent loan applications.

As an external loop researcher used the mission of the case - 4 stating.... *and let's say we are the ones that want to prove to our customers that if we say you are going to be disbursed within 15 minutes, we want to keep our word and give them an opportunity to have the money in 15 minutes”*

C4P2

Therefore, the external feedback loop is a time interval from 15 minutes of the loan lifecycle, as shown in figure 35.

7.4.4 Debate and Action

The final stages of SSM Mode 2 related to 'debate' and 'take action' (Checkland and Winter 2006) are the bright lines of 'current' from 'desired' in modeling the changes in the organization (Kawalek, 2008). He noted that in the process of modeling, three activities are always included (P. 54):

a-) The contextual analysis of what is feasible to be changed when referring to current situations.

b-) Construction of Design Model

c-) The analysis or Judgment of different alternatives design to meet the outcome.

Hence, the researcher-led the discussion to identify the processes that work well or don't work or locate any delays occurring in any part of the lending process. Perhaps the word 'delay' was not a proper word in one organization where the entire loan process lasts only 15 minutes. It is the shortest achieved possible time ever. There are only two key roles in case – 4: the branch employee who deals with the customer request, the validation team validates it, and the branch employee immediately disburses the cash. Hence the improvement has to go beyond the existing landscape seeking to please the customer and to diversify the way they reach the organization:

“What we have noticed and what we consider that e should invest to improve the process is to limit the time that client waste in the branch”

C4P1

“So within that we want to give opportunity to every to every citizen to apply through online and to get even if they don't have, for example, a bank account or even if they're not bankable, bankable customers, because this is lets say our main challenge”

C4P2

Since *the current process is initiated in the branch and terminated in the branch* (C4P2) the organization aiming to be the most innovative in the market is constantly seeking other ways to establish uninterrupted communication with the customer. *‘I would consider it to be less systemic process ‘C4P1. In attempts to accommodate the participant's worldviews, the researcher asserted that: Specifically for this process, it was to provide another way of reaching the customers and giving them the feedback was considered the online process to be designed. So while the client could apply directly from home where would be comfortable and we don't need to come anymore in branch he doesn't need to come into the branch and He would get the feedback faster”*

C4P1

And it all makes sense because the validation team is already in place and is performing well. While creating another entry point through an online interface would make the case - 4 organization even more resilient, reduce the queues in

branches for loans and perform all actions online...*then we will have this face recognition in order to make sure that the person who applied is the same person who is discussing my idea and with the phone number and everything and it will be like motion one and then we'll have the opportunity of disbursement customer can get he will sign the documents before disbursement he'll sign documents through SMS and then customer will take the will be performed disbursement with money the person will be through bank if a customer has a bank account only cash in the new process*”

CAP2

Therefore, the best way to deal with the customer concerns in the current situation is to offer them another communication channel to apply for a loan. It shouldn't matter the time and day and the place of the application. While digitalization, this sort of communication could maintain the case - 4 promise to the customers for delivering a 15 minute loan lifecycle product. The only delay or burden in the early stages of the online approach could be an increased workload in the validation team, which needs to be addressed from both technologically and human resources perspectives.

7.4.5 Limitations

The researcher experienced a very fruitful experience in the case - 4 fintech. The business model was fascinating. However, regarding the research, he would have preferred a few more discussions with Management and IT as business and system owners of the loan application system. Other interviews aimed to understand plans relating to the issue-based definition for more training in agile and how the Management will cope with that and with LSS. The researcher would have preferred some workshops or more time with participants to explain some of the key concepts of SSM he used during the interviews but understands that logistically wise was hard to manage.

7.4.6 Reflections

In this case study, the researcher explored the usage of LSS for helping the case -4 organization improve their product interfaces to easy customer access. In understanding the situation and showing that understanding in the rich pictures, the researcher identified that the organization's main product was consumer loans. The core roles carrying out the activities were branch people and the validation team in the head office.

While the current process didn't show any weakness in terms of performance, leveraging other customers' entry points was considered crucial for the organization. That was the main reason for triggering the LSS training and analyzing their product. There was no dedicated LSS team in the case - 4. Senior and Management team had a full LSS training from certified LSS professionals and applied the findings immediately in their organization.

CATWOE and root definitions for the primary task and issue-based problems guided the researcher in developing the conceptual model of purposeful activities for the loan product. Given that only one product (consumer loan) was offered from the organization in case - 4, the primary task was not hard to define. The researcher asserted that training could be something the organization had to work on for the issue-based problems. Particularly in the agile mindset, as all participants noted. The debate between system and real-world (Figure 35) and actions needed to improve the current situation was in line with suggestions for a less systemic process and a new online interface accessible from anywhere at any time. The external feedback loop of providing the loan lifecycle in 15 minutes was aggressive but achievable. Main LSS tools used in the case - 4 application was *Kaizen event and SIPOC (C4P3)*. All participants appreciated the kaizen event as a process that added transparency in their daily works by mapping the process in very clear workflows. Participants didn't inform of any challenge they faced during LSS, while alongside many activities, the prevailing skill they were focusing on developing in their organization was agile. They all acknowledged the role of Top Management as the main factor in the success of LSS, and using its tools empowered them in working and thinking independently. In the next section, the researcher discussed all case studies' findings and concluded the chapter with an overall chapter summary.

Primary Research Summary and Conclusions

7.5 Discussions and Conclusions

The research aims to evaluate LSS implementations in financial services using SSM. The fundamental idea behind SSM is that the process of inquiry into the complexity of the 'real world' can be simulated as a learning process (Augustsson et al., 2019). 'Real world' in SSM language refers to the unfolding and interacting flow of events and ideas experienced as they happen in everyday life (Checkland, 1990). As explained by the researcher in Chapter 7: Methodology and clearly showed in the current chapter, the

learning process went from finding out about the problematical situation into a more structured format using activity models and actions taken to improve the problematic situation. In contrast, the activity models were used to learn about the 'Real world' and facilitate the interventions.

One of the benefits of SSM is that it helps identify structural and social factors of the problematic situation (Reid et al., 1999). Thus, the researcher started his investigation by identifying by key people and structures involved in each LSS implementation. He illustrated the initial understandings of each situation in the forms of rich pictures to build a rough idea about the key people involved, their relationships, and some of the reasons that triggered the LSS application. The researcher continued building CATWOE tables, where customers, actors, transformation, worldview, owners, and the environment were identified. Transformations and Worldview played a pivotal role in formulating root definitions (RD) for each case study, building Primary task RD and Issue-Based RD. These activities were fundamentally crucial for constructing conceptual models. They helped the researcher to identify and validate all interventions that happened during LSS implementations.

Problem structuring is fundamental in SSM assisting the researcher in understanding and challenging participants' worldviews (Winter, 2006). As a result of this approach, the researcher concluded that in most of the case studies, LSS projects were managed via people or units with LSS certifications. They acted as stand-alone units (Project Offices) managing all projects that organization was trained to carry out. Top Management plays a significant role in triggering or pausing a particular LSS project. Once the decision to go ahead was granted, LSS trained officers start the measurements of a specific process (Voice of Business, Voice of Customers, CTQs, KPIs, etc.) and define the key stakeholders affected by the process under the investigation. Only in Case – 4, there were no dedicated person or unit to carry out the methodology of LSS. The organization used the chance of LSS training for medium, senior, and top management and directly applied the principles of the method. Given the very agile nature of that organization and having only one core business process the decision was well justified. By employing the qualitative methods and interpretative nature of SSM, the researcher brought together diverse worldviews from several stakeholders.

Different organizations were using various LSS tools but the same DMAIC framework. Most participants highly appreciated kaizen events associated with the SIPOC tool.

They consider them easier to understand, to apply, and to remember. Also, during Kaizen events (see section 4.4.3), all stakeholders gather to analyze the current situation and make suggestions for the future. The analyses were facilitated through the SIPOC tool (see section 4.4.5), which was used to map existing processes in the form of activity diagrams. Furthermore, this was a good opportunity to show how and what other colleagues do in their daily working lives. Hence adding transparency as the result of the mapping. In one case only (Case -3), instead of Kaizen were used Fishbone (see section 4.4.6) and Pareto (4.4.7) analysis. The main reason was confidentiality since the project's scope was financial, and it wasn't deemed necessary to share the data with others in Kaizen events. Overall, all participants were happy with applying the LSS methodology, and all actions taken for improvements were validated using different metrics and feedback loops of SSM.

The lack of interviews with decision-makers such as Top Management and IT people became evident in the entire empirical research. In the CATWOE tables, they were classified as business and system owners of the processes under investigation. Their role is crucial in triggering or not LSS methodology and implementing the changes suggested by the LSS application. Since the research analyzed post implemented LSS projects, their impact is perhaps minimal. In case of a new process investigation where the decision to intervene could be implementing a new solution or upgrading the existing, their role would have been determinant for the study. However, their involvement in the current research would have been beneficial to build a clearer picture about the improvement phase of the LSS DMAIC framework in particular. Checkland and Poulter (2006) suggest that the researcher can use SSM to examine any human system's roles, norms, values, and political nature in these tricky situations. Roles are related to different social positions through hierarchy and titles. Norms are linked with behaviors attached to the roles, while values represent the standards used to judge those behaviors. Checkland and Poulter (2006) recommend that the researcher should reflect on these three norms.

One of the main concerns expressed by all participants was that the implementation or improvement phase of DMAIC usually takes more time. It led the researcher to build Issue-Based RDs for each case study. The root cause was common in all cases. IMPLEMENTING FINDINGS because of LSS projects takes time.

Many participants suggested various strategies to deal with that. Some organizations

address that concern via agile training or incorporating LSS teams with agile teams or through motivation, others through the commitment of existing teams.

When an LSS project is triggered, officers who are usually trained to apply that methodology are tasked to carry the project successfully. Their approach is based on the DMAIC framework (see section 4.4.1), where D stands for Define, M for Measure, A for Analysis, I for Improvement, and C for Control post-implementation results. While they possess excellent skills to define, measure, analyze and control, it looks like they do not have enough power to manage the improvement/ implementation phase. According to the current research and as expressed in the CATWOE table, Top Management and IT are the owners of this stage. They hold power for the changes from business and system perspectives.

In informal discussions with participants, the researcher understood that project offices (with LSS skills) and IT teams are usually two different departments. They also differ in backgrounds, with core skills on LSS while lacking IT technical knowledge in a broader context. Besides, IT teams have their people for analysis and developing the solutions and prefer to work independently. They use different methodologies, and when it comes to implementations, they need to think, plan, and budget all the changes in advance. These issues might raise tensions in communications with non-IT departments, affecting the speed in implementing the changes. Irrespective that these concerns were not verified in the empirical study due to ground limitations, the researcher recommends that they are worthy of looking at them.

Financial services are very well formalized with a clear structure and line of authority. Due to digital transformation, they are undergoing a rapid transformation (see Chapter 3), and delays are very costly. It could happen that it would be hard to deal with two independent (LSS team and IT) technical streams.

All participants agreed about the impact of management on the success of LSS. Integration of LSS with the agile approach is intended to bridge this gap of the implementation phase, avoid latencies from management approval while immediately implementing the changes in cooperation with IT teams. Based on above the analysis of roles, norms, and values, the financial services value rapid decisions and transparency. Differences among them could impact the effectiveness of LSS.

Therefore, a proper SSM analysis in LSS effectiveness should consider how power is

expressed (Checkland and Poulter, 2006). Due to the logistic limitations of research, it was not thoroughly explored. However, it provided beneficial insights that further investigations or implementations can benefit from this study. It was entirely based on analysis one of intervention of SSM (Checkland and Poulter, 2006) and shed light on social and political aspects of LSS applications in financial services.

The research illustrated the value of SSM. It helped the researcher gain insights about values, norms, power, and politics that should be considered for LSS implementations in financial services. It enabled the researcher to identify the challenges of LSS applications in financial services by bringing together multiple perspectives from various individuals and organizations.

This research also highlighted how SSM leverages system-thinking perspectives by providing a holistic understanding of the situation from multiple participants' views. It also facilitated the researcher not only in identifying the problems but also in identifying actions for improvements. Most importantly, it provided insights on dealing with complex unstructured situations, engaging main actors, hearing their opinions, and contributing to improvement. The research was also in line with qualitative research's principles where the researcher doesn't see himself as an expert.

Through this study, the researcher emphasizes the value of SSM tools such as rich pictures, CATWOE, root definitions, and conceptual models that helped him accommodate all participants' responses. These tools increase the validity of the research by assisting the researcher in evaluating the accuracy of his findings and encouraging other practitioners for further study.

It is advisable to reflect on the limitations of SSM as well. As helpful as SSM is in identifying the key people, processes, structures, issues that accurately led to improvement, problems may arise if not all people are involved. Those related to ownership. Hence full stakeholder' participation to which extent they can afford and bring the change is critical in SSM evaluations.

7.6 Chapter 7: Summary

While in Chapter 7: Methodology, the researcher extensively justified his methodology choice. In this chapter, he showed how he applied in practice the principles he explained research methodology. He came forward with four empirical cases studies of LSS

implementations in financial services. The researcher used key activities of SMM Mode 2 (Perceiving the Situation, Building Purposeful Activity Models, Debate, and Take Action) to accommodate participants' feedback and analyze the findings generated from their interviews. While Checkland and Scholes (1990) suggest three types of analysis using SSM, the researcher leveraged analysis one of the interventions and fully reflected analyses two and three. He was very interested in figuring out how LSS was deployed in financial services. Rich pictures, Root Definitions, Conceptual models, Debates, and Action taken tools facilitated from SSM helped the researcher to identify key roles involved in LSS implementations in financial services. It also enabled him to underpin why LSS was triggered, the root cause of the problems and actions taken to improve the situation, challenges those participants faced during LSS application, and suggestions on how these challenges could be overcome. In table 10, the researcher has presented stage three of the thesis's map, including the main findings from the current chapter.

Table 10:

Thesis Mapping (Stage 3) Summary of Findings and Reflections from Chapter 7.

Thesis Research Mapping (Stage 3)	
Key findings from Chapter 7 – Findings and Reflections	
Research Question	Key Findings Contributions
What are the main challenges of Lean Six Sigma implementations?	LSS challenges and limitations discussed in Chapter 4 –Literature Review.
How Lean Six Sigma has been deployed and implemented in financial services?	Identification of key stakeholders in LSS projects. Underpinnings the reasons of why the LSS is triggered in financial services. Identifying LSS tools used in financial services, analyzing the root causes of the problems and action taken to improve the situation under investigation. Identifying main challenges in LSS implementations in financial services.

<p>What are the barriers/ gaps that make Lean Six Sigma less effective than manufacturing?</p>	<p>2. Barriers in Lean Six Sigma in financial service are critically reviewed in Chapter 4- Literature review.</p> <p>Improvement phase in LSS burns a lot of energy. LSS teams do not have full ownership in all stages DMAIC, but different financial services have different approaches. Different organizations with strong culture LSS fit or business models cope differently about this problem (Chapter 7).</p>
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(Islamaj, 2021).

Next chapter will be the final chapter where the researcher will summarize his conclusions of the entire research benchmarking them with research aims, objectives and gaps. He will also highlight the research contribution in academia and practice and come up with recommendations for future studies.

Chapter 8: Contributions and Recommendations

8.1 Introduction

This chapter summarizes his findings in the literature review and findings & reflection chapters to measure his contribution in knowledge (literature) and practice of LSS applications in financial services. At the end of each chapter, he summarized the respective findings towards research questions and objectives using a thesis-mapping journey (Tab 4; Table 10). In this way, he kept track and followed up on whether the research questions were properly addressed throughout the piece.

The chapter moves forward with all the previous findings in one final table. Contributions towards knowledge and practical gaps identified for LSS applications in financial services were followed by the implications on LSS practitioners leveraging the SSM will be explained.

Satisfying the customer is a fragile line that divides well-performing businesses from underperforming ones. In today's organizations, customer satisfaction refers to customers' happiness between their expectations and the products and services they receive (Hill et al., 2017). In financial services, particularly in banking, the customer service level is the key indicator for measuring the banking's core competitiveness. In this context, LSS, a customer-centric, methodology is used to help the financial services adopt process improvement measures and pursue quality and efficiency management mechanisms (Zhuo, 2019). An essential tool of LSS that was identified in research' empirical case studies and the review of the literature, was the process mapping during Kaizen events. By defining the boundaries and needs in the existing process, ones could see and identify issues and take necessary measurements to improve or remove the processes that weren't generating values (PU, 2021). It was identified as a key element of LSS's core framework of 'DMAIC' or Define, Measure, Analyze, Improve, Control methodology. Blending DMAIC with strategies like kaizen or fishbone and Pareto analysis proved to be a powerful way for practitioners to improves operations within their organizations.

For instance, lending is one of the most important products in financial services, and findings showed how well they had leveraged LSS services to streamline their processing and scoring lending activities. As Sunder (2016) noted, the advantage of the LSS methodology over other process improvements (PI) approach uses lean services to

reduce cycle times in the processes and the Six Sigma tools in the service of a critical goal towards customer satisfaction. Obtaining and measuring the process data for making essential decisions helped LSS to achieve success. LSS has its own roots in manufacturing (Investopedia, 2021), but it doesn't mean that implementations in services could be as good as in manufacturing. Furthermore, a sensible, lack of a composite model for LSS in one industry or country sets the wrong context for the others (Yaduvanshi and Sharma, 2017). Different authors (Ganesh and Marathe, 2018) that have identified a large research gap in understanding LSS from system thinking perspectives are strongly advocating a more holistic approach for LSS evaluation.

Hence, the researcher used the gap of lack of research of LSS from a system thinking perspective and leveraged Soft System Methodology (SSM) activities and tools to evaluate LSS applications in financial services. For this purpose, the researcher used four main activities of SSM Mode 2 'finding out,' 'modeling,' 'debating/debating,' and 'defining/taking actions to improve' (Checkland and Poulter, 2010). Rather than a technique, SSM is considered an action-oriented methodology to tackle complex social situations using multiple perspectives when defining a problem (Mingers and White 2010). They noted that structuring the thought about "how to think" could improve and provoke learning about social situations. And that's what the researcher did experience during his empirical case studies journey in the financial services. He identified the main stakeholders, structures, roles, and issues that triggered the LSS application. From an unstructured situation, he gradually moved in a justified way to a more structured situation where all activities performed by all actors were presented in pictorial view, in the form of interdependencies. By accommodating participant worldviews in improving the situation in their organization, the researcher's goal was not merely to fill a 'hole' but also to contribute in academia and practice. He firmly believes that bringing forward very fresh and direct findings from financial services will stimulate "informal learning" for students and practitioners.

The entire researcher's experience was an everyday experience. It was found that the creation of different types of learning atmospheres should be understood as a multi-sensory experience (Cox, 2018). While engaging in informal learning themselves interacting with others, practitioners facilitate informal learning in their workplace (Moore and Klein, 2020). The researcher remains hopeful that readers of this research will understand how LSS has been deployed in financial services, the main issues, and

how to handle them. Alongside that, although not primary the research's goal, they will be able to understand firsthand how the SSM is applied in practice to facilitate it when dealing with complex situations in their organizations.

The researcher is optimistic that his research will inspire more and more studies in the area of interest. The need for more practitioner involvement and research to close the gap with academic studies is adequate to be inspired for more research like this. In the next sections, he will present the research questions and objectives, practical and academic gaps, and benchmarked them against the findings to check if his thesis has achieved its aim and objectives. Once validating these variables, the researcher will conclude the chapter by presenting the contribution, in theory, management practice, and suggestions for further research.

8.2 Literature Gap

The literature review revealed several gaps in applying LSS in financial services (see section 6.1). The number of publishing LSS articles steadily declined last decade, with Europe representing a lower number of articles than the USA and Asia. Alongside that, the number of empirical studies in financial services is even lower. Some scholars were complaining that there was no clear picture of which tools were used in LSS applications. The researcher also noticed that most research on LSS was quantitative in nature-based heavily in the survey data, while qualitative ones were missing. In this context, he identified a real need to explore LSS implementations from the system thinking perspectives. Also, different authors suggested closer cooperation between academics and LSS practitioners.

8.3 Practice Gap

The literature's first and foremost practice gap is that the ratio of LSS publications between academics and practitioners sits towards 80%, with 20% in favor of academicians (Patel and Patel, 2021). There are a lot of stereotypes and misconceptions on LSS, if it applies only to manufacturing or supply chains (Antony et al., 2012). Some authors differentiate Six Sigma from Lean, complaining that it is more a statistical tool than a management strategy (Gamal, 2010). Envisaging LSS too technical due to the Six Sigma approach; some people think it is challenging to implement it (Rodgers et al., 2019). The critical success and failure factors do not differ too much among LSS applications in manufacturing, supply chain, and services; some practitioners find them

hard to understand (Antony et al., 2012). Besides, both factors continue to be the same and have not changed for many years, posing a severe practical limitation (Anthony et al., 2019). One particular gap that is not addressed and is leading organizations nowadays towards hesitation or withdrawing from LSS is the improvement/implementation phase of the DMAIC framework. The main concern is that it burns too much energy (Mishra et al., 2021). Some participants during empirical research noted that LSS is very good for process change management, but not that much in automation, whereas the opposite is for agile methodologies.

8.4 Research Aim and Objectives

The research aimed to explore LSS implementations in financial services. The researcher managed to bring forward and analyze LSS applications in four empirical case studies in the financial services domain. Through them, he has extended the understanding of how LSS was deployed in financial services, the main challenges faced during LSS application, and actions to overcome them. Research questions and objectives and how they were addressed in the current research, including the summary of the research-mapping thesis, follow next.

8.4.1 Research Questions and Objectives

Research Question 1: What are the main challenges of Lean Six Sigma implementations?

Objective 1: To examine the literature review of context of the research such as financial services. To explore LSS from earliest publications to the latest. To improve the scope of the research by using different theoretical lenses in manufacturing services and financial services. The researcher used this objective as a gateway for entering LSS applications in financial services. Since LSS has its roots in manufacturing, a critical evaluation of LSS applications in manufacturing and services must be provided to prepare the researcher better for the main aim of his research. The researcher used chapter 4 in the literature review to bring together discussions from many authors regarding LSS applications in manufacturing, health care, education, and public services (sections 4.5, 4.6, and 4.7). They suggested that LSS should care more for the outcome of the end-user rather than replicating the success model of manufacturing. Geographically wise Europe was scoring lower than other countries. Most LSS case studies presented in the current research were from Europe and analyzed by

practitioners, instantly bridging the central gap. In some examples benefits of implementing the LSS were not exceeding the cost of implementation. At the same time, different authors noted a lack of generalized LSS models and tools for a particular industry.

The also researcher listed several LSS trends (see section 4.8.2) and developments from literature review in order to measure their impact on the challenges identified. Therefore, the researcher claims that this objective was achieved as well.

Research Question 2: How has Lean Six Sigma been deployed and implemented in financial services?

Objective 2: To examine the process of LSS implementation in financial services by using SSM. To identify why LSS was triggered, who were the main stakeholders, tools they've used, problems encountered, and what interventions were undertaken to solve those problems.

This objective was achieved in chapter 7, where the researcher evaluated four practical LSS implementations (Section 7.5) by using SSM (see Appendix I). During findings and reflections about empirical studies, the researcher discussed how he managed to identify in all cases studies who were the key stakeholders involved in LSS implementations, the reasons for triggering the LSS methodology, and what tools were used from LSS perspectives to address their problems. The researcher revealed that in most cases, the management triggers LSS projects, requiring analyzing a particular process based on customer complaints and the weight of the specific function in the overall process landscape. All stakeholders involved in the primary research were all people involved directly in LSS applications in financial services. The researcher also traced the interventions taken in LSS projects to show how they dealt with problems that emerged and whether they were happy or not with the

solution provided. In all empirical case studies, the researcher provided the necessary steps to improve the situation and used different feedback loops to measure the success of the interventions.

Research Question 3: What are the barriers/ gaps that make Lean Six Sigma in financial services less effective than manufacturing?

Objective 3: To critically evaluate LSS applications in financial services and identify the main gaps that may influence the successful adoption of LSS methodology.

Once the researcher had a clearer understanding about LSS applications and limitations in manufacturing and services in general he dived himself in financial services domain. The main reason of this review was to check whether some of the gaps in financial services could be answered in other domains of services or manufacturing. He went through to a great number of experiences and discussions about LSS implementations (see section 4.7). There weren't many differences about CFSs and CFFs amongst different industries (section 5.5). He noticed that while the number of publications in LSS in financial services was declining, even the numbers of those published were mostly coming from academicians rather than practitioners. Different authors (Sreedharan et al., 2020) in their latest articles were recommending that in order to deal with these issues, the financial services do need a roadmap for implementing the correct model of LSS. The road map has also to come up with adequate infrastructure for a successful application of LSS methodology. Researcher noticed as well that most of LSS limitations in literature existed for quite some time, turning them in serious barriers for the future of LSS.

One of the most prominent barriers in LSS implementations was Improvement stage of DMAIC framework. In manufacturing (see section 4.5) is not as much as it is concerned in services, because manufacturing aims towards excellence, applying changes fast and acting quickly (Almacá & Gierenes, 2013). Unlike manufacturing, the main challenge of LSS in services, as a whole domain, including financial services, is that the implementation/ improvement stage in DMAIC framework burns a lot of energy (Mishra et al., 2021). This gap was unanimously confirmed from all participants in the primary empirical research.

“you can shorten some phases like define, measure, analysis but ... improve will take time...”

C3P1

While the literature doesn't explain why this is happening in financial services, the empirical research provided beneficial insights underpinning some of the reasons, if not the leading cause of burning time in the improvement phase of LSS (See section 7.5). The researcher concluded that while LSS has strong ownership in Define (D), Measure

(M), Analysis (A), and Control (C) stages, it doesn't have much control or power for the Improvement (I) phase. Since this activity is managed by teams (IT mostly) other than LSS, this process requires a strong commitment from Top Management and IT to deal with (Section 7.5). Besides, in some organizations these could coexist in two different entities.

This gap is critical for the future of LSS implementations, and it goes beyond the manufacturing reference. As explained in Chapter 3, financial services are undergoing rapid change. They need to adapt themselves quickly and urgently deal with issues that cause delays. Time is non-negotiable. Financial services have to ensure that all methodologies they employ have the total end-to-end ownership in their processes to deliver what customers demand from them quickly.

However not all financial services respond the same the improvement stage. In Case -1 and Case -2, they mostly complain about the ownership of LSS team, suggesting the agile approach to address that problem. In Case – 3 they both acknowledge the Improvement stage concerns, but they do not consider as a barrier, but a normal stage. The underlying reason of this attitude was very high culture fit of the organization when it comes to LSS knowledge. Interestingly in Case – 4 this problem did not exist at all, irrespective of the fact of deep LSS knowledge. AS understood by the researcher this was mostly related to business model they apply. More studies are advised in this context for exploring the impact of culture fitness in LSS implementations or different business models (fintech) have different LSS approach by using the same tools.

Another gap identified in literature of LSS projects in financial services was that LSS has no tools to deal with soft aspects of such as attitude, norms and behaviours (Ablooshi et al., 2020). Also in the section 5.4 one of the aspect that SSM could help in dealing with LSS barriers was addressing the human factor in the organization. As explained above, thanks to the cultural stream of the SSM (Checkland & Scholes, 1990) the research was able to unearth cultural and business model differences with financial services domain coping differently for improvement stage of LSS. Humans add complexity in a given process, and differ manufacturing from other service organizations like banking is that due to high degree of automation, manufacturing is qualified as a physical system, whereas services as human activity system (Wilson & Van Haperen, 2015, p. 36).

Therefore by identifying the differences with manufacturing, within financial services researcher claims that this objective, alongside other objectives have been fully answered in his research. In the next section, he will summarize the contribution in literature and practice.

8.5 Research Mapping Summary

In this section the researcher brings together the findings in literature review and in primary research findings and reflection chapters and represents them in thesis mapping tables.

Table 11

Thesis Mapping: Stage 4

Thesis Research Mapping (Stage 4) Key findings from Chapter 3, 4, 5 & 7	
Research Questions	Key Findings Contributions
What are the main challenges of Lean Six Sigma?	1-) Improvement phase in DMAIC burns too much energy. 2-) Critical success factor do not differ to much among industries 3-) Lack of generalized LSS model 4-) LSS lack tools for soft aspect of organization.
How has Lean Six Sigma been deployed and implemented in financial services?	1-) Top Management is a key factor for triggering and the success of LSS in financial services. 2-) Main LSS tools were Kaizen and SIPOC. Differences among culture fit LSS organizations. 3-) LSS is very good for process change management, while agile is very good for automation.
What are the barriers/ gaps that make Lean Six Sigma implementations in financial services less effective than manufacturing?	1-) Lack of LSS practitioners' publications. 2-) Lack of empirical studies 3-) Lack of LSS evaluation from system thinking perspectives

	4-) Improvement stage of DMAIC framework burns a lot of energy
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(Islamaj, 2021)

Table 12 marks the final stage in thesis mapping by introducing the summary of all contributions towards research aims and objectives.

Table 12

Thesis Mapping: Stage 5 Summary of contributions.

Thesis Research Mapping (Stage 5)			
Summary of contributions			
Research Aim	Main Research Question.	Literature Contribution	Practice Contribution
The aim of the research was to explore LSS implementations in the financial services. The researcher managed to bring forward and analyze LSS applications in four empirical case studies in financial services domain. Through them he has extended the understanding on how LSS was deployed in financial services, main challenges faced during its application and actions to overcome them.	What is going on with LSS applications in financial services?	Achieved	Achieved
Research Questions	Research Objectives		

<p>Research Question 1:</p> <p>What are the main challenges of Lean Six Sigma implementations?</p>	<p>Objective 1:</p> <p>To examine LSS applications in a wider context other than financial services and provide a critical review of LSS implementations in manufacturing and services.</p>	<p>Achieved</p>	<p>Achieved</p>
<p>Research Question 2:</p> <p>How has Lean Six Sigma been deployed and implemented in financial services?</p>	<p>Objective 2:</p> <p>To examine the process of LSS implementation in financial services, by identifying the reasons why LSS was triggered, who were main stakeholders and tools that they've used, problems encountered and what interventions were undertaken to solve those problems.</p>	<p>Achieved</p>	<p>Achieved</p>
<p>Research Question 3:</p> <p>What are the barriers/gaps that make Lean Six Sigma in financial services less effective than manufacturing?</p>	<p>Objective 3: What are the barriers/ gaps that make Lean Six Sigma implementations in financial services less effective than manufacturing</p>	<p>Achieved</p>	<p>Achieved</p>

(Islamaj, 2021)

8.6 Research Contribution

This study used SSM to understand some of the main activities of LSS applications in financial services through practitioners' perceptions and experiences with LSS. Lean, Six Sigma, and Lean Six Sigma are very well-known concepts in literature with a vast array of applications in all types of industries and services. While the audience of this research could generally come from financial services, the findings from the literature review showed barriers and limitations do not differ too much among various industries.

Therefore, any conclusions that address any challenges in financial services could be valid for other domains or reinforce the current research's impact. Literature review revealed that a very high proportion of LSS studies in existing literature are coming from quantitative data surveys suggesting a real need for more qualitative studies.

Furthermore, the number of LSS publications was in continuous fall, reinforcing more qualitative research to locate and possibly isolate the underlying factors of the current situation. Earlier on, the researcher summarized the literature and practice gaps and showed how they were linked and developed into the research questions and objectives.

In the following sections, those gaps are brought forward to benchmark the contribution of the current research. The researcher claimed that he achieved the research aims and objectives through empirical case studies and extensive critical review. This qualitative research and the usage of SSM helped the researcher present a snapshot of the main activities involved in LSS applications. SSM was developed as a result of deficiencies from positivist methodologies in dealing with social issues. It stresses that the social world differs from the natural world since human beings act purposefully and attribute meanings to their actions (Hanafizadeh and Mehrabioun, 2018). Using SSM, the researcher brought a social perspective of daily operation lives LSS in financial services, making it easier for the readers to understand how things evolved. The research differs from other quantitative studies of LSS due to the application of SSM either. Practitioners will use this study as an opportunity to learn more about LSS implementations, but they will also be able to learn how to apply the SSM in practice.

Using participants' perceptions, the researcher filled the gaps identified in the literature and has prepared the stage for future studies where a lot of opportunities and synergies between SSM and LSS lie ahead. The research results suggested that LSS was very well appreciated in the organizations where it was applied. Not all of them had the same approach towards LSS tools used. However, there was common ground among all of them in how to cope with challenges. The researcher contributed in theory, particularly in Operation Management (OM) theory, by adding more lenses to the LSS domain. There is a significant shift in today's financial services towards digitalization and automation, meaning a shift towards product-oriented processes rather than human-oriented organizations. This movement impacts LSS, and literature needs to be updated reflecting the findings from the research participants.

The natural symbiosis where practice feeds the literature with conclusions and future recommendations, while gaps in the literature require practice to bridge them, is one of the great attributes of the current research. In fact, that's the advantage of pursuing the DBA program. Unlike traditional Ph.D. programs that emphasize academic creativity, DBA programs alongside academic contribution focus on applying management theoretical achievements and research techniques in practice to improve the quality of actual business decision-making (Liu et al., 2021). The current research findings show a massive gap between academia and practitioners' LSS publications in financial services and other industries.

Blending the literature review with empirical case studies findings ensures that the thesis, if not closed, has bridged that gap significantly by bringing both parties together.

8.6.1 Contribution in Literature

The research has significantly contributed to the literature.

The first contribution of empirical research with four new case studies stands in narrowing the gap consisting in the lack of LSS empirical studies across all industries, including financial services (Sunder and Antony 2015; Mahmutajet al. 2015; Buavaraporn and Tannock, 2013; Lokkerbol et al. 2012; Wang and Hussain, 2011; Snee and Wang and Chen, 2010).

The second contribution the empirical research with four new case studies stands on in keeping on hold a little bit the steep decline of LSS publications in the last decade (Sreedharan., Pattusamy, Mohan and Persis 2020).

The third contribution in improving the low scoring of Europe in LSS publications (Panayiotou, and Stergiou 2020, Alblooshi et al. 2020) since three case studies are originated in Europe.

The Forth contribution stands in improving the ratio of LSS publications among academia and practitioners. Some late reports show a ratio of 80% to 20% in favor of academia (Patel and Patel, 2021). The researcher considers himself a practitioner and therefore contributed to narrowing this gap.

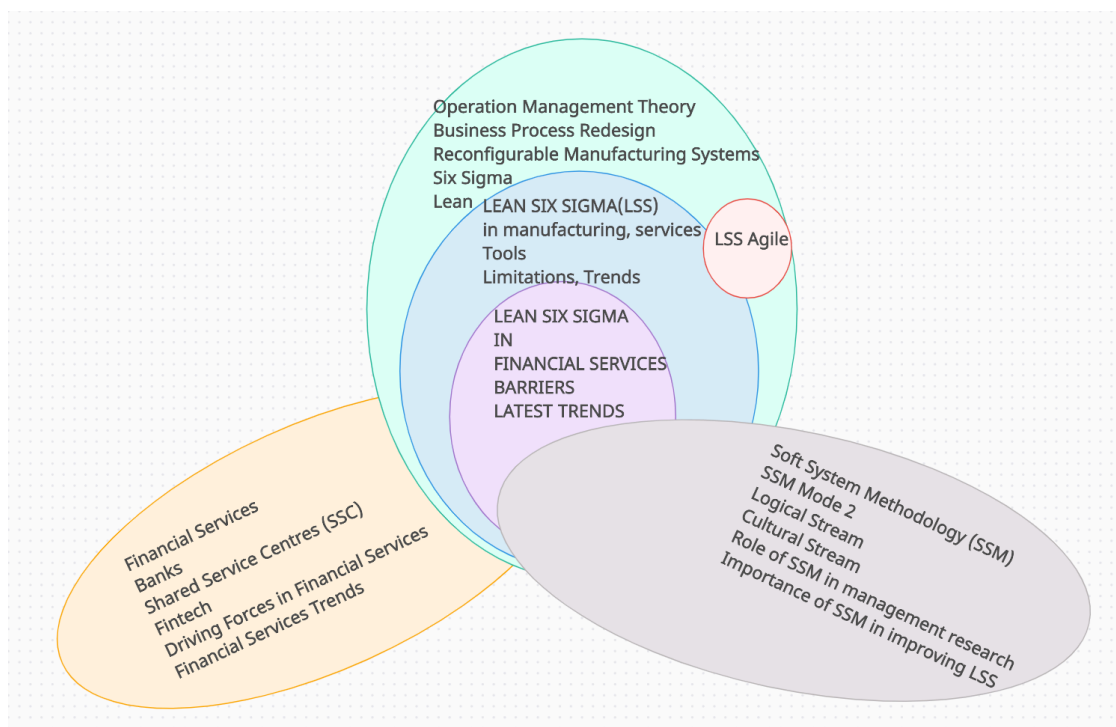
The fifth contribution shows which tools were mostly preferred in LSS applications in financial services. The literature review revealed no clear picture of which tools were

used in LSS applications (Raja and Raju, 2016, Mishra et al., 2021). Research showed the Kaizen and SIPOC were widely used as the most efficient tools of LSS.

The sixth contribution is updating the OM theory (McClay, 2019), which consists of four theories: Business Process Redesign, Reconfigurable Manufacturing Systems, Six Sigma, and Lean manufacturing. "Lean manufacturing" and Six Sigma were both OM concepts originating from manufacturing. During analysis of the implementation stage of LSS, one of the suggestions on addressing time-consuming and the ownership issue of the improvement stage of DMAIC (see section 9.1.3) was the integration of LSS with Agile; hence researcher added another lens in the beige color (Figure 36) that reflects that particular finding,

Figure 36

Additional Lenses in Theoretical Journey (LSS Agile)



(Islamaj, 2021)

The seventh contribution in literature is in Project Management (PM) literature where LSS belongs as well (Sunder, 2016). In particular with stakeholder theory, which includes the effective management of stakeholders for having successful LSS

implementation. Research brought forward many aspects in different financial services organizations in how LSS has to be successful, by effectively dealing with human factor.

The eighth contribution is the evaluation of LSS implementations in financial services using SSM. There are significant research gaps in understanding LSS from a system thinking perspective (Ganesh and Marathe, 2018) since LSS has no tools to deal with soft aspects of the organization (Alblooshi et al., 2020). The researcher applied SSM to evaluate LSS in financial services, therefore, addressing this gap.

Although the research was carried out in financial services, the audience for this research was significantly extended since the literature review revealed that critical success and failure factors do not differ too much among industries (Antony et al., 2020). The researcher suggests that participants from public services, health care, education, supply chain, or manufacturing can also benefit. Also, limitations identified in each case study can be considered a steppingstone for future studies and narrowing even more the gaps identified and paving the way for the future of LSS as a preferred methodology. In the next section, the researcher highlights the contribution of his study in practice, which is as important if not more as the contribution in literature for a DBA student.

8.6.2 Contribution in Practice

In this section, the researcher will explain the contribution of his thesis in practice. The context of his research is in the financial services. The researcher initially prepared the audience with the latest developments in that sector by highlighting the driving forces such as innovation, process disruption, and digital transformation. Forces were rapidly changing the financial services landscape with the emergence of fintech, branchless banking, automatic credit scoring, and instant payments (Chapter 3). It is such a great joy for the researcher to summarize his thesis contribution in practice since he managed to bring a diversified case studies portfolio in the financial services using traditional banks, shared service centers, and fintech.

First and foremost, all contributions linked to the literature are equally relevant and have significant contributions in practice. They all illustrate the latest LSS applications in financial services and, at the same time, assist the practitioners with a portfolio of

best LSS approaches and tools in case they decide to implement them in their organizations.

Second (or ninth in the row) significant contribution in addressing the practical biases from LSS methodology. In particular, the implementation/improvement phase of DMAIC burns a lot of time undermining LSS and leading some organizations in hesitation to select it as a preferred methodology (Sreedharan et al., 2018). Research underpinned some of the reasons causing it and brought forward the best practices in dealing with them (see section 7.5). Practitioners should be aware that before starting the LSS project, they must ensure complete ownership of all DMAIC stages. Anyway, they also can either visit the empirical cases (Chapter 7), which are with deep culture fit of LSS where improvement is not that much a barrier, or adapt business model as in case -4 where there were no concern at all.

The third main contribution is the application of SSM. Alongside the justification of SSM as a method for evaluating LSS in financial services, some authors suggest a lack of empirical SSM studies (Mahalepa and Goede, 2017). They noted that the original focus of SSM was organizational rather than academic.

Therefore, the researcher's decision to use SSM to evaluate LSS implementations in financial services was a right decision with multi-sided practical contributions. It showed how LSS was deployed in financial services and illustrated how SSM works as a problem structuring method (Checkland and Poulter, 2006).

It is such a rare opportunity to have an LSS audience from all domains for the current research while having an SSM audience and practitioners interested in this study. The researcher presented all SSM stages in an orderly fashion, helping the practitioners understand the research methodology better and critique, review, refer, and validate the research findings in future studies.

In the next section, the researcher will summarize limitations and contributions, benchmark them towards future research, and identify the possible integration areas between SSM and LSS that will help address some of the issues identified.

8.7 Future Research

The study of evaluation of LSS in financial services using SSM showed significant findings and contributions in literature and practice. Nevertheless, several limitations and opportunities were identified and mentioned by the researcher throughout his thesis. Although the thesis has an adequate number of participants to conduct its empirical case studies, the number of participants was limited. As mentioned earlier, perceptions by participants from management and IT departments are needed to investigate their role and impact on the success of LSS projects. Studying these two aspects of the research would also shed light on the effectiveness of suggestions for using the agile approach for implementing the findings faster as the results of LSS. It needs to be measured whether the commitment from Management and IT is higher due to agile incorporation. This can be achieved via qualitative research rather than quantitative ones. As mentioned in the literature, qualitative research is a more appropriate approach to better understanding relationships (Aldemir et al., 2018). Another suggestion for further studies is the claim identified in the research that LSS was very good for process change management while agile was very good for automation. It can be reached via quantitative or qualitative studies as well. The researcher recommends further studies on the possible integration of SSM with LSS, claiming a considerable contribution in practice if they were properly utilized.

For instance the researcher leveraged the logical and cultural stream of SSM (Checkland & Scholes, 1990). Logical stream is related with rational analysis, and suggestions in for future and desirable changes in all empirical case studies fit exactly with the action taken as result of LSS implementations. Meaning that if it were used alone, the SSM would have probably reached the same output as LSS. But in the same time it can be used in conjunction with six sigma. Researcher claims that a new version Soft Six Sigma (Figure 37) could be highly beneficiary for practice and academia. As explained above the rational stream works and may have the same LSS outcome, but it is additional value is cultural stream, which will close ones forever all LSS gaps for soft aspects of the organization.

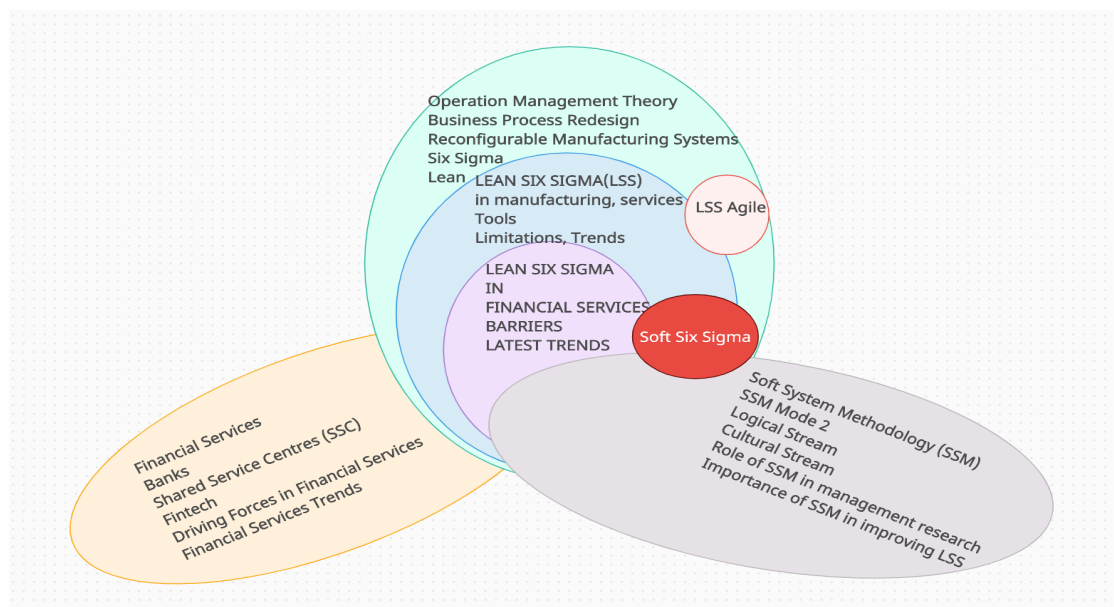
SSM is an ad hoc or DIY methodology that can deal with complex situations and significantly help practitioners cope with those situations. It is cheap, cost-free, and ready for use. SSM is an open framework like an open-source code (androids or ios) where developers work on top of that and prepare tailored-made applications. The most

appreciative tools in LSS, according to the participants in the current research, were Kaizen events and SIPOC. The underlying reason why people like the kaizen events so much is that they would be able to picture the AS-IS (current state) accurately and TO BE (Future state) of a particular process (Section 4.4.3). It enables them to see how the process flows, activities undertaken by their peers. They also would use activity mapping as the intervention tool. It would be easier for them to intervene in the map rather than abstract it.

On the other hand, the entire philosophy of SSM is a dynamic conversation between (as is) rich pictures and takes action (to be) for improving the situation. Checkland (2001) himself allows for applying methodologies according to the researcher's worldview, indicating that he shouldn't limit himself and strictly follow each step in the method. Some authors (Behera et al., 2015) have used SSM for project selections, defining the project's scope and the nature of reducing the conflicts among stakeholders in the project initialization phase (Hanafizadeh and Mehrabioun, 2018). AS mentioned in the literature, the wrong project selection is a weakness of LSS, which can benefit from SSM integration. One of SSM's weaknesses is that it doesn't provide clear activity diagrams but conceptual models that many practitioners find difficult to follow.

Figure 37

Additional Lenses in Theoretical Journey for a new version of Soft Six Sigma.



(Islamaj, 2021)

The researcher has added another lens (Figure 37) to emphasize the importance of further research on the soft version of LSS brand new one that doesn't exist in literature named Soft Six Sigma (SSS). The benefits of applying the SSM to evaluate LSS implementations brought up some interesting themes for future studies such as: Effectiveness of conventional methods in human depended organizations in financial services. It can be extended in all areas of services domain higher education, public and health care services. They are all human depended. As result of cultural stream of SSM these issues came to surface and need to be explored until a mature version of Soft Six Sigma will emerge. It is very interesting as well to compare and further research systems thinking vs. lean thinking. The philosophy of Lean is to generate value by removing waste (see Chapter 4), whereas the philosophy of systems thinking is to generate value by removing complexity (See Appendix I). More studies are also recommended when it comes to the latest trend of agile that all organizations are experiencing. Agile is way of working, whereas SSM is discipline or way of thinking. BY comparing them there were soon will come up with Soft Agile version (doesn't exist in literature), which is very well justified, from the current research. Discipline or the way of thinking should always precede the way of working (agile), therefor this can very well work in practice.

Furthermore many authors (Ramírez-Gutiérrez et al., 2021; Hosseini and Rezaei, 2013) have leveraged the use of unified modeling language (UML) language or Viable System Model (VSM) to mitigate the visual handicap of conceptual models. Ramírez-Gutiérrez et al. (2021) strongly suggest that combining quantitative and qualitative methods is necessary for tackling complex problems.

Therefore, the researcher believes that there are many opportunities for practical applications of stand-alone SSM versions using UML or VSM tool, but more importantly, in combination with LSS. A combination that will address even more gaps that exists in the LSS approach. It will be cheaper, very flexible. Given that gathering for kaizen events will be limited due to pandemics using SSM to identify the problems and Six Sigma to measure the deviation, it will be a significant contribution. The following section marks the completion of the thesis and, therefore, the completion of the wonderful DBA journey for the researcher, leaving a forever door open for further studies.

8.8 Concluding remarks

The underlying theme of the current research was to evaluate LSS implementations in financial services in attempts to underpin why the applications of LSS in financial services were less successful than in manufacturing. The researcher used the theoretical lens to critically review the current literature and understand LSS in financial services against manufacturing and a broader context of services itself. The stereotypes of services vs. manufacturing still exist. Still, they are not fundamental in the sense that copying successful LSS experiences in manufacturing would solve and address all LSS problems in financial services. Problems exist in both domains, persisted for many years, and more importantly, critical success and failure factors do not differ too much among industries as the literature suggested.

The research went beyond this dry comparison and brought the audience to the rapid changes in the financial services landscape. Regardless of previous success or failure stories in any of the current methodologies, changes require a different approach to be dealt with. While the rise of technology is a game-changer in technology for financial services, it could threaten its existence. The outbreak of the covid-19 pandemic disrupted everybody's lives.... e.g., it delayed the data collection process of the researcher by one year at least. It vastly reduced the chances for new participants while delaying interviews with agreed ones. However, when it comes to financial services, their reliance and adoption of digitalization helped them be ahead of the game compared with others. According to Karadima (2021), almost 80% of world asset managers see digital transformation as a top priority, 64% up by the year before emphasizing the impact of pandemics in accelerating the tectonic changes in financial services landscapes.

Therefore, future references and studies of LSS in financial services should match their readiness of technological changes happening in services rather than comparing with manufacturing. The researcher remains hopeful that his research findings will be used as a steppingstone for other research to level up LSS for the new era. Agile, LSS Agile, SSM are concepts that will be mentioned and further developed in upcoming years in operation management (OM) and operation research (OR) fields.

The researcher recommends further studies of the Soft Six Sigma version that will address almost all the gaps identified in LSS literature, blended version Agile, or building a new practical stand-alone version of SSM. Using SSM with UML or VSM or

integrating with other hard methods could have an immense impact contribution in practice and literature, bringing even closer academicians and practitioners.

The current research is not the end of the journey but the beginning of new awareness in present project methodologies fields. Perhaps building a competence center in Sheffield Hallam University would narrow the gap between academia and practitioners by bringing forward more practical versions of SSM like Soft Six Sigma, Soft Agile, or any stand-alone SSM. The researcher welcomes any recommendations or feedback on his work while hoping the reader will enjoy his piece.

Many thanks for supporting him in what he considers as the most significant stage in his life.

Chapter 9: References

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10 Appendixes

Appendix I Systems Thinking, Soft System Thinking and Soft System Methodology (SSM) **Annex I: Systems thinking, Soft systems thinking and Soft System Methodology (SSM)**

I.1 Introduction

The aim of Appendix I annex to provide an auxiliary information about systems thinking, soft system thinking and Soft System Methodology structure and theoretical background. Its roots are in system thinking (Checkland, 1981); therefore, information in the annex will overview system thinking and its role in management research. The overview will be followed by a brief introduction to system thinking' classes such as hard, soft system thinking (Checkland, 1999) and critical system thinking (Jackson, 2000). The second half of the chapter will explore SSM underpinning the background of SSM Mode 1 and the shift towards SSM Mode 2. The chapter concludes with discussions of SSM's role as a research methodology and how it is applied in the current research.

I.2 Overview of Systems Thinking

According to Mingers (2006), system thinking has a long and complex intellectual genealogy. Its label has been widely used to synthesize different theories encompassing natural and human sciences (Midgley, 2003; Ackoff, 1971). In the early 50s, there was a need for a new trans-disciplinary approach. Von Bertalanffy, a famous Austrian biologist, came with the idea of building a 'general system theory (GST) that would help deal with the growing complexity of natural and human science' (1956). A couple of years later, Von Bertalanffy (1968) was against the concept of dividing systems into parts and studying them individually in his GST book. Instead, he advised a more holistic approach:

It is necessary to study not only parts and processes in isolation, but also to solve the decisive problems found in the organization and order unifying them, resulting from dynamic interaction of parts, and making the behavior of parts different when studied in isolation or within the whole (Von Bertalanffy, 1969, pp. 49-50).

Rapoport (1986) noted that the phrase 'general system theory' implies that there are entities in the world called 'systems' that all of them or some parts of them have something in common. He suggested that the task of GST is to define these systems and explain how that approach will help to understand the world better. Whitchurch and Constantine (2009) concluded that GST from Von Bertalanffy (1968) is a theory aimed at building concepts, postulates, principles, and derived theorems that apply universally across all domains of application. Therefore, it is called a theory of system in general. Initially, GST was developed in two forms: studying complex systems and developing theories to explore further that particular phenomenon and secondly as a method to investigate complex systems and intervene to improve them (Cordoba-Pachon, 2010).

Churchman (1968) pointed out that 'systems' are opened, and they go beyond their natural boundaries. In his attempts to explain how individuals should use and benefit from system thinking, he came along with five assumptions: system goals, performance measurement, elements, resources, and the environment context with surrounding restrictions. Some other scholars (Ruben and Kim, 1975) argued that GST is broader than a theory. They have used an alternative name *Weltanschauung*—a unique worldview that requires the adoption of thinking about systems. In bottom line, system thinking is a way of looking at the world in which objects are interrelated.

Dominici and Levanti (2011) highlighted the logic behind system thinking is to overcome the limitations of the traditional reductionist methods for analyzing complex situations. In system thinking, the whole and its parts exist at the same time but at different levels (Baum and McKelvey, 1999). This approach is bottom-up and takes into account all dynamic interactions among various parts in order to understand the behavior of the whole (Stacey et al., 2000).

Hence the central to systems perspective is holistic thinking, as opposed to reductionist thinking (M.Q. Patton 2015). He suggested that the functions and meanings of the parts are lost when they are separated from the whole. Hence a systems approach requires synthetic thinking, which is fundamentally different from analysis thinking. To analyze is to explain by taking things apart, whereas to synthesize is to see something as a part of a larger whole. They complement each other since the synthetic analysis deals with the reasons why the system works, while analytic explains how the system works and system thinking enables their integration (M.Q. Patton, 2015).

The core theme of systems theory is that it deals with the structure and behavior of all kinds of organized wholes (Bertalanffy, 1968; Rapoport, 1986). However, Luhmann

(1995) argues that the synthetic focus on systems and structures has never been theoretically solved. In their study for understanding the ability of relations between processes, Brown and Schwartz (2009) revealed that their participants could describe components but not the nature of relationships. The same comprehension problems were identified from (Jacobson and Wilensky 2006; Wilson et al. 2006) as well.

To make this efficiently happen, Schwaninger (2001) identified two different streams of inquiry in system thinking. One stream is called 'cybernetic thread,' the science of self-control and communication in complex and dynamic systems (Wiener, 1948). According to Beer (1994), this tradition facilitated the emergence of a new approach to dealing with structures and the adaptations of learning. For Mingers and White (2010), this approach controlled the system and the interactions among the components. In management studies, cybernetic on the observer observes the system and constructs the models while interacting with it, instead of studying as a stand-alone system (Von Foerster, 2003).

The 'servomechanism thread' (second stream, led to new methodologies for modeling and simulation of the system complex dynamics (Forrester, 1968; Forrester and Senge, 1980). Sterman (2002) highlighted that focus of system dynamics focuses on issues modeled as systems and are essentially made up of variables that form feedback loops while simulating continuing processes. Cybernetics, dynamics, and complexity theory played a great role in the development of system thinking principles (Mingers and White, 2010). It is worthwhile to mention that complexity theory which rose from the general system theory, doesn't necessarily mean a complex explanation. It helps to explore the relationships between members of the system and shed light on how the system interacts with the external environment (Sammut-Bonnici, 2014).

Overall, system thinking aims to see how things are connected to each other and how they interact with the external environment. It is a holistic approach for solving a complex problem, which is hard to solve using a conventional approach Abidin et al., (2019). It is the process of understanding that every element is influential (Kefalas, 2011). In this context, Rodriguez (2020) suggests that tackling problems arising in an open system requires considering all components and their surrounding environment prior to reaching a conclusion (Rodriguez, 2020).

The advantage of system thinking in dealing with complexity has also played a great role in management, which is further discussed in the next section.

I.3 Role of Systems Thinking in Management

Checkland (1999) suggested that system thinking addresses the process of thinking by using system ideas, while systems theory describes the theory of systems, taking as given the status of systems as a thing in the world. Through the years, system thinking experienced an increased attention adoption in management, which led to distinguishing different domains in system theory. According to Daryani et al. (2014), the first realm was named systems of science and was focused on exploring the theory of systems in subjects such as biology, sociology, and economics, whereas the second one dealt with technology and management was concerned with the advancement of technology and society. The philosophy presented in both systems science and technology domains is considered the third realm (Daryani et al., 2014). Hence the introduction of system concepts not only provided a sort of guidance in science and technology and underpinned its philosophical background.

In this context, different scholars (Barile et al., 2014; Mingers and White, 2010), studying the role of system thinking in management, have identified the main activities of the system thinking approach that contributed to practice and management.

- Holistic observation of a particular phenomenon.
- Emphasizing the importance of interactions between different elements and levels
- Structuring the problematic situation in the hierarchy of system levels

Cezarino, Junior, and Correa (2012) noted that system thinking (Checkland, 1981) and the principles of system theory (Bertalanffy, 1975) constituted the foundations of theoretical archetypes in understanding companies by their organic sense. They advised that it would have been impossible to systemically evaluate an organization without investigating its content and internal and external relationships with the environment.

For Minger and White (2010), the fundamental contribution of system thinking is related to the development of Operational Research and Management Science, where soft thinking emerged as an opposition of hard system thinking in OR (Checkland, 1979), which later on was involved in the development of problem structuring methods (Rosenhead and Mingers, 2001). Haines (2000) and Allen (2000) identified the positive impact of system thinking in change management as well. They see the organization as one system comprised of a number of scheduled activities depending on different levels. Jackson (2016) concluded that system thinking enables a framework that can produce sustainable success. Such successful adaptations of system thinking are traced back to

project management, where Cavaleri et al. (2012) and Williams (2016) leveraged this approach to go through uncertainty and complexity and make the innovation projects successful. Urze and Abreu (2014) highlighted the role of system thinking knowledge management in improving the ability of employees to generate new ideas and products. In the supply chain, the application system thinking improved analysis by overcoming the unnecessary boundaries and hierarchies (Maull et al., 2012)

But the impact of system thinking is not a practice-only approach. In management research, the system thinking approach is classified under the functionalism paradigm (Jackson, 2000). In functionalism, the organization is identified as an open system, whereas its elements try to achieve their goal under strict environmental constraints (Churchman, 1968). Here, to improve the performance, Jackson (200) noted that it is required to intervene whilst the analysis is carried with predefined measurement indicators. On the other hand, Checkland (1981) and Eden and Ackermann (2001) argued that the success of system thinking is thanks to the subjectivism nature of the interpretative paradigm. They highlighted that individual learn through the shared dialogue in the interpretative approach, and the goals are usually determined when consensus is reached once all individuals' opinions are accommodated.

However, in various human activities, main stakeholders found themselves excluded from power-sharing in their social systems. Maru and Woodford (2001) noted that addressing these issues requires a renewed focus on emancipatory commitment. Ulrich (1983) was the first to attempt to find a critical and practical solution to the emancipatory issue through the development of the framework called Critical System Heuristics (CSH). According to Ulrich (2002), the CST was intended to provide both those involved in social planning and those affected by those plans with the heuristic support for reflections and the educated debate to take the necessary actions. Gregory (1996) argued that it is limited in simple coercive situations. Later on, a post-modernism approach dealing with social aspects of the organization emerged when White and Taket (1994) applied a practical base solution based on textual analysis of stakeholders' views rather than prescribed methodologies. They believed that their postmodernist approach would encourage diversity and creativity.

Managing complex organizations has always attracted attention. In this context, Vikhornova (2018) highlighted that the system thinking approach perfectly matched leaders' wishes to effectively manage their organizations by understanding interactions

among different components. An excellent organizational change might require a system thinking mindset, and Acaroglu (2019) pointed out six main themes that could potentially help today organizations in building a strong system thinking mindset such as (1) interconnectedness, (2) synthesis, (3) emergence, (4) feedback loops, (5) causality and (6) systems mapping. The goal in today's organizations is their ability to be responsive to market changes in a timely and fashionable manner. System thinking helps frame complex problems by showing alternative directions for improvement (Westover, 2020).

System thinking comes up with different classes that will be further discussed in the following section.

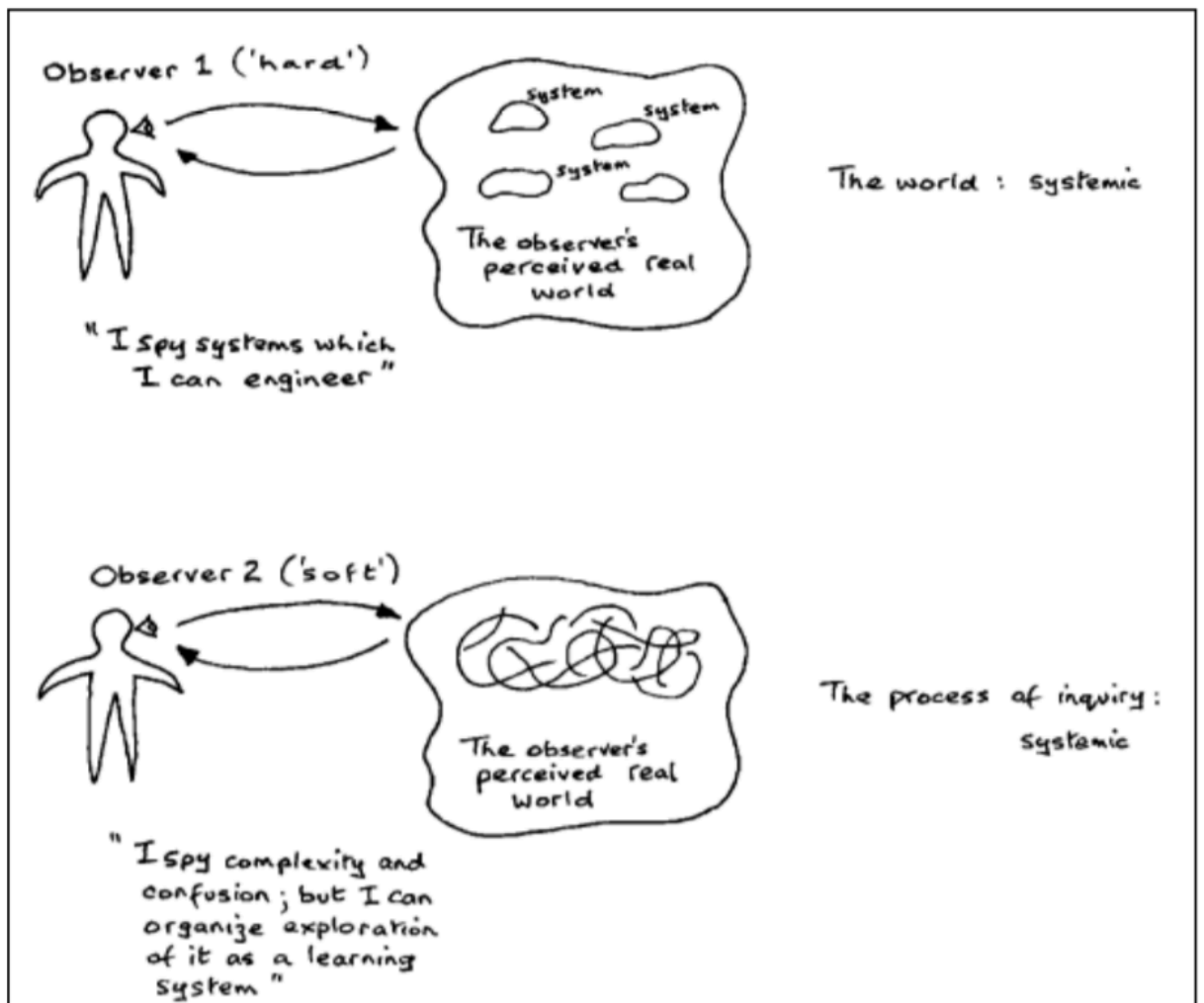
I.4 System Thinking Classes

Many organizations have applied principles of system thinking to develop a holistic perspective on their business model by specifying actors, owners, procedures that drive each process' component (Kádárová et al., 2014). Unlike other traditional analysis methods that break systems in separate elements for further analysis, system thinking focuses on how systems' elements interact with each other and how the system works over time in the context of larger systems (Lutkevich, 2020). Milroy (2021) identified two streams of thought: reductionist and holistic approach, speaking in practical terms for solving problems and understanding how best to improve a problematic situation. When an error happens, a reductionist approach focuses on the error and finds the immediate remedy. In contrast, the holistic approach underpins the reasons for why the error occurred instead of how. In some articles, Checkland (1981; 1983; 1999) outlined that the origin of this division lies on 'epistemological break' between cybernetic (hard) cybernetic (soft). He classified system thinking into 'hard' thinking that tends to be objectivist and expert driven. The soft' thinking that is more interpretative by nature and involves the observers is system definitions.

Hard system thinkers see the world as one system comprised of subsystems that can be engineered for improving the system, while soft system thinkers perceive the world as complex, which can be structured and learned more through the process of inquiry (Figure 11).

Figure 11

Hard and Soft System Thinking Concepts.



(Checkland, 1999, P. A11)

Later, Jackson (2000) came out with another theory or school of thought called Critical System Thinking (CST) that will be used to address the shortcomings of hard and soft system thinking approaches. The main theme of Jackson (2000) is that hard and soft thinking can be combined based on the social characteristics of the system under investigation. He also emphasized the role of *politics* in dealing with complex situations. Since the thesis is based on SSM as a key representative of soft system thinking, where Checkland (1999) handovers the systematicity to the inquiry process, the researcher considers that further discussions on CST are irrelevant for the study.

I.4.1 Hard System Thinking

According to Burge (2015), the term "hard systems" came to light from Checkland in 1975 when he was trying to justify the development of "soft systems." He suggests that hard system thinking is a system-based approach that can be used to tackle a problem by implementing change. For Kirk (1995), this approach represents a model with precise

objectives and goals that can be quantified to provide an explanation or pattern of how elements of the system work and, therefore, the whole system. Checkland (1981) argued that the single view of the hard system to achieve improvement showed some weakness in dealing with the diversity of human views and values in the organization. This approach falls under the functionalist paradigm (Jackson, 2000), implying that its subsystems should properly reach the organization's goals regardless of its people.

I.4.2 Soft System Thinking

Checkland and Schon (1990) expressed the concern that in hard system thinking, the general idea is to provide 'something to meet the needs,' concentrating the main focus on 'how' rather than on 'what' or 'why.' In 'soft' system thinking, the fundamental assumption is that people's perceptions and preferences about the world differ. Therefore they recommend the soft thinking approach since it tries to understand all participants' views and at the same time tries to accommodate a consensus among their different opinions. Ackoff (1994) and Checkland (1999) defined soft system thinking like a social system comprised of interconnected parts and opened to the external environment.

Unlike the functionalist nature of hard system thinking, soft system thinking has an interpretative content (Crowe et al., 1996), which enables a pluralist view from all stakeholders (Checkland and Poulter, 2010). Checkland (1999) outlined that soft system thinking emphasizes social-oriented issues since almost all messy or ill-defined situations contain human activities. Hence these problems are hard to be defined and quantified with social and political consequences. An important feature of soft system thinking is that it helps in structuring the problems through well-defined activities (Checkland and Poulter, 2006). Participants' involvement in soft system inquiries ensures a greater understanding of any complex situation and will guide decision-makers to intervene adequately. Still, it helps them shaping their visions and plans.

Based on philosophical assumptions of soft system thinking different authors (Reynolds and Holwell, 2010) came up with different frameworks with practical relevance as shown in Table 3.

Table 3

Different Soft System Thinking approaches

Different Soft System Thinking Frameworks	Philosophical Assumptions	Originated
Soft System Methodology	Deals with complex	Checkland, 1970

	situations. Promotes learning. Encourage debate from different stakeholders and accommodate their views to improve situation. Uses seven stages to structure the problematic situation.	
Strategic Options Development and Analysis (SODA)	Deals with complex situations. Highly subjective. Encourage OR consultants to work with clients to improve problematic situation.	Eden, 1970
Inquiring System Design	Deals with complex situations. Neither operation nor goals can be separated from the influence of a large political system.	Churchman, 1971
Interactive Management	Deals with complex situations, encourage participants of experts	Ackoff, 1981
Strategic Assumption Surfacing and Testing (SAST)	Deals with complex situations. Uses four stages: Assumption' specifications, Dialectic stage, Assumption Integration phase, Strategy creation	Mason and Mittrof, 1981

(Reynolds & Holwell, 2010, p. 10)

Referring to the table above, Gerald Midgley summarized the development of soft system thinking in three waves (Midgley, 2000). Wave one was focused on concrete issues and problem solutions for the problems identified, while wave two gradually moved with a softer perspective on issues and people perceptions. There was increased attention on power relationships and their impact in perceiving and addressing the problems in wave three.

All the methodologies listed in the table above deal with complex situations, there are iterative to some extent and put a great emphasis on participant's involvement. According to Checkland and Winter (2006), this is mainly related to the learning approach of soft system thinking, which in its core facilitates the learning process among/ from stakeholders. In this context, SSM theoretical framework blended the seven steps inquiry process provides the best practical relevance (Checkland and Haynes, 1994). It is not limited to experts, OR consultants, or political influence as other methodologies do (table above) but encapsulate all other features in one framework. It provides a view as holistically as possible where all social or political aspects can be explored, the learning approach ensures getting information from all angles, and above all, you do not need to be an expert. While all other methodologies tend to have a restricted focus in any area of research, with some expert knowledge to carry them out, SSM is open to the external environment, issues, and participants. Flexibility, learning, and the holistic approach of the SSM were the main reasons that researcher chose this methodology to evaluate LSS in financial services. In the following sections, he will particularly explore SSM and its contribution to management research.

I.5 Soft Systems Methodology – SSM

I.5.1 Overview of SSM

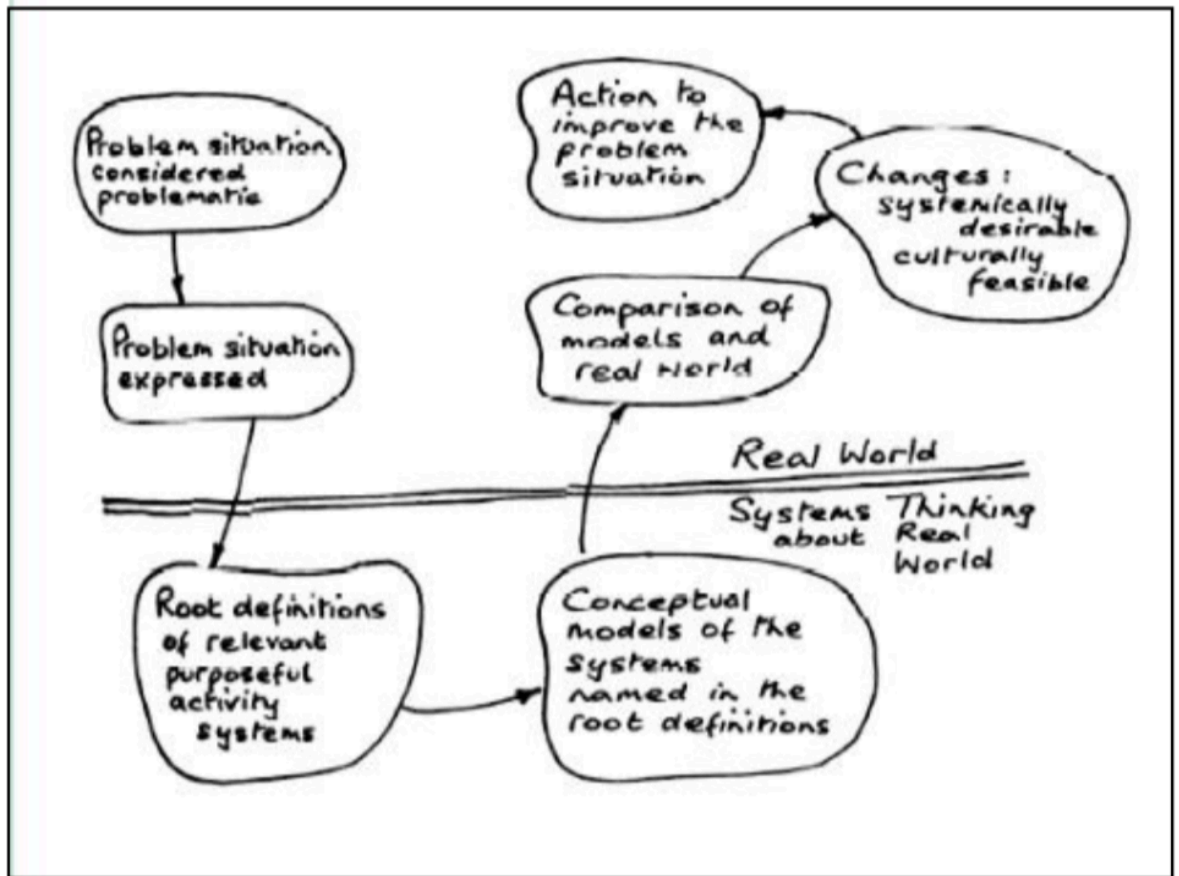
According to Reynolds and Holwell (2010), Soft System Methodology was originally developed by Peter Checkland in 1970, whereas the version, which is very much studied nowadays, as well, was published in 1981 (Mehregan et al., 2012). SSM is action-based research that uses models to structure the debate coming from various objectives, needs, interests, and perceptions from different people belonging to a problematic or ill-defined situation (Checkland, 1989). The fundamental assumption of Checkland is that any complex behavior is better understood if it is regarded as a whole rather than as one specific aspect of it. Paying attention more in whole rather than parts led Tajino, James, and Kijima (2005) to conclude that SSM is systemic rather than systematic.

In a theoretical context, system thinking is broad and sometimes not easily understood, and therefore, Peter Checkland developed the SSM to bridge this sort of gap between academia and practice (Checkland and Scholes, 1990; Checkland, 2000). The version presented by him in 1981 contains seven stages used to structure the problematic situation in two main groups: real-world and thinking about the real world (Checkland,

2000). As a system-based approach, it facilitates both the participants and the researcher to consider and have a clearer understanding from different perspectives.

Figure 12

First SSM version published by Checkland in 1981.



(Checkland and Scholes, 1990, p. 27)

Checkland and Holwell (1998) concluded that SSM tackles complexity and real-life problems through multiple perceptions of different stakeholders rather than one single view. Eriyatno (2013) describes SSM as a holistic approach for solving unstructured problems using system-thinking principles to understand the interactions between different stakeholders and translate them into the larger system specifying input-output and the transformation process. Purnomo (2012) highlighted that unlike other hard system thinking methodologies that include the process of thinking of the goal, result and target in advance, the emergence of SSM is linked with the assumption that the purpose of the system to be built is problematic. A uni-dimensional view of what the problem is will never come anywhere near to the complexity of the real world (Checkland and Poulter, 2006).

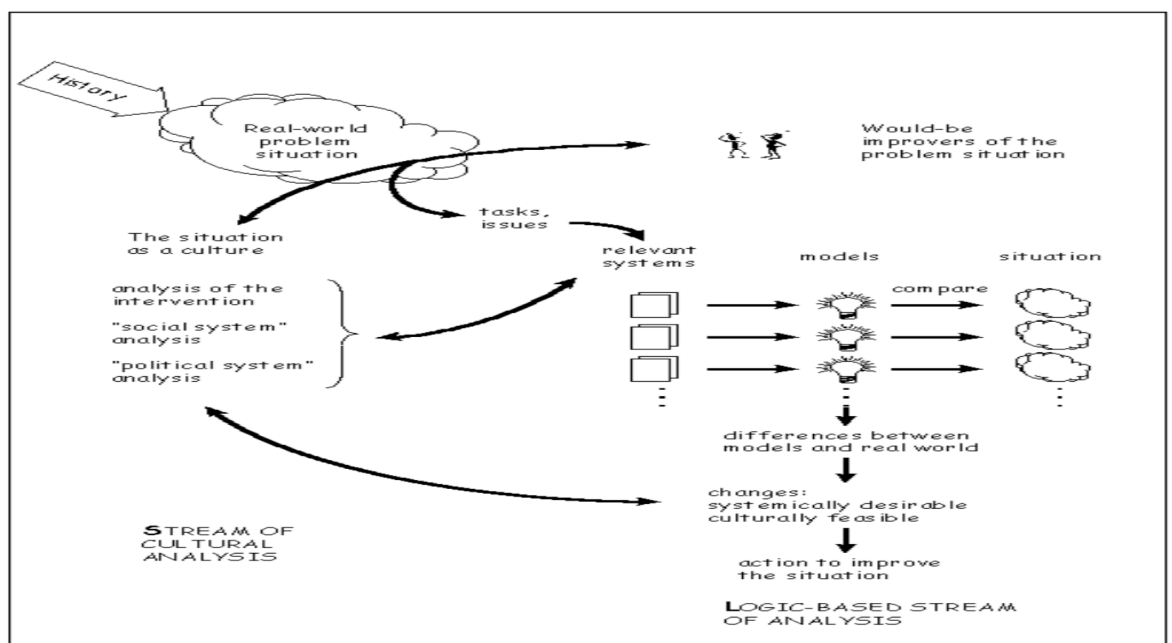
Despite many advantages in dealing with messy situations, SSM came along with some limitations. Lane and Olivia (1998) argued that imposing simultaneous changes cause conflicting results. Avison and Fitzgerald (2003) expressed their concerns that SSM lacks precise tools to ensure effectiveness. In this context, Yinghong (2007) highlighted that the effectiveness of SSM is highly dependent on an individual's expertise and

knowledge. Furthermore, the root definitions obtained from the process of expressing the situation were meaningful only under a special worldview, and the final recommendations were proposed based on those views (Hanafizadeh and Aliehyaei, 2011).

To better address issues related to human affairs, the external environment with the organization, and taking acceptable actions to improve the situation, by the end 1980s, Checkland came up with an improved version of SSM, as shown in Figure 13 (Checkland and Scholes, 1990). This version, alongside with already known logical stream (seven stages), has an additional characteristic that is related to cultural analysis (Checkland, 2000). He suggested that the first version was so linear, and the improved version of SSM Mode 2 goes beyond the problem-solving approach in converting the SSM in a proper inquiry process. That's the main reason that the researcher used the revised version of SSM to build as holistic as possible view of LSS applications in financial services. SSM Mode 2 facilitated the research to understand better the problems that occurred, and steps taken to deal with LSS interventions and have a clearer picture of norms, values, and issues that participants from different organizations faced. Checkland and Poluter (2010) pointed out that SSM facilitates a strong grip between researchers and stakeholders to thoroughly understand the situation and, therefore, provide the right intervention steps.

Figure 13

Second version of SSM.



(Checkland & Scholes, 1990, p. 28).

According to Checkland (1990), the fundamental idea behind SSM is that the inquiry process for understanding the complexity of the 'real world' can be simulated as a learning process. That is why Mingers and White (2010) emphasize the importance of applying this methodology in dealing with social and human issues. It is a process that goes from finding out about the problematical situation to defining it and finally taking action to improve it. For Bunch (2003), SSM provides the basic theory to identify and define a problem and, at the same time, explores interrelationships of system components in a broader context. Hanafizadeh and Mehrabioun (2018) outlined that more than a tool, SSM, is considered an action-oriented methodology for dealing with complex social situations through multiple perspectives. It emphasizes structuring the thought about thinking in how to improve the situation and therefore provoking learning.

However, learning about social complex situations in an organization is not an easy task since and requires an adequate level of skills to correctly interpret people perceptions and models, which ultimately would affect the improvements. Hanafizadeh and Alihyaei (2011), in their study, considered special SSM knowledge or skills as a weakness for implementing SSM in different organizations. This was in opposite of Mingers and Taylor (1992) claims that SSM strength stands in practical deployment from people with a non-technical background. Anyway, they all suggest skills gap could be overcome going through many empirical studies.

SSM is a problem structuring approach in many areas of management research and project management (Checkland and Scholes, 1990; Checkland, 1999). But the fundamental questions that Barile, Pellicano, and Polese (2018) were seeking answers to were: What distinguishes a social system from a physical system? How to qualify the divergence in terms of representations between living and non-living systems? The researcher provided different discussions that system thinking principles and the applications of SSM provide a framework for dealing with multiple perspectives and heterogeneity in a social system. These discussions convinced him that SSM has more benefits when it comes to investigating complex situations than drawbacks. Hence, he decided to use the shorted SSM version in his study to evaluate LSS implementations in the financial services domain.

I.5.2 SSM Modes

A team of master and doctoral-level researchers at Lancaster University led by Peter Checkland carried out different academic inquiries into real-world organization problems. Most of these works helped better understand SSM, which were reflected in the published books of Checkland (1981) and Checkland and Scholes (1990). Both publications represent two different SSM approaches and show the flexibility of SSM to deal with various issues in organizations. According to Kreher (1994), the first SSM Mode uses SSM to conduct a study, whereas SSM Mode 2 conducts work in the real world. Jackson (2000) noted that SSM Mode 1 is a problem-solving approach for complex situations and contains seven stages. SSM Mode 2 leverages learning to run the inquiry about the complexity and make suggestions for the future.

5.5.2.1 SSM - Mode 1

Checkland and Scholes (1990, p. 28) noted that SSM Mode 1 is conceived as a "formal stage-by-stage application of the methodology," an explicit way of undertaking learning and action using SSM stages. The inquiry in SSM Mode 1 is usually undertaken as a consultancy job into any 'soft' problematic situations, which is hard to be dealt with conventional methodologies (Turner, 2008). He suggests seeing Mode 1 as an intervention into problematic situations since it provides those from outside organizations with more insights. Checkland (2001) highlights that the traditional model of SSM Mode 1 is broken into seven stages, grouped into two main activities: real-world activities in stages 1, 2, 5, and 7 and system-world activities in stages 3 and 4, as shown in Figure 12 above. These stages are:

Stage 1: The problem situation unstructured

Augustsson, Churruca, and Braithwaite (2019) suggest that the first step tries to get an initial grasp of the problematic situation, such as circumstances where the problem exists, not the problem itself. It would be adequate to talk or interview one stakeholder at least and get his/her perception of whether things could get better or further attention is required.

Stage 2: The problem situation expressed

This stage of SSM describes and presents the problematic situation in the form of drawings or rich pictures where stakeholders can tell directly from the picture the relationships between actors, processes, structures, conflicts, and some of the issues. Côté-Arsenault and Morrison-Beedy (2005) pointed out that in order to have a richer

picture with as many perspectives as possible, it is important to analyze a-) actors involved in the intervention, b-) social-cultural context of organization and c-) and power holders. According to Wageningen UR (2008), the principle behind rich pictures is tools for organizing thoughts to understand better what is going on and, therefore, identify the root cause of the problem. This holistic view will unearth stakeholder relationships, which otherwise would have been missed if not applied.

Stage 3: Root definition of relevant systems

For Burge (2015), this is a very critical step for SSM since the root definition (RD) is the essence of the situation under investigation. At the core of RD stay the transformation process, which is performed by the relevant system. To ensure that RD is drafted correctly, Checkland and Smyth (1976) developed the mnemonic CATWOE were:

C stands for Customers who receive the output of the transformation process

A stands for Actors who carry out the activities of the transformation process

T stands for the purposeful activity that Transforms the input to the desired output.

W stands for Weltanschauung or the worldview. The belief that makes sense of RD

O stands for the Owners or decision makers in the organization

E stands for the environment or external constraints significant for the system.

Checkland (2000) and Wilson (2001) strongly recommend cautiousness when building the transformation process because it is frequently misunderstood.

Stages 4 and 5: Conceptual models and comparison with stage 2

Following RD, Winklhofer (2002) noted that in stage 4 are developed the conceptual models of the relevant system. Wilson (2001) suggests that a number of activities included in conceptual not to exceed 7 ± 2 and has to represent all activities carried by actors. In stage 5 is used to find similarities and differences with the perceived real world in stage 2. It is a sort of reality check of what needs to be done and how improving the situation

Stages 6 and 7: Feasible, desirable changes and action to improve

These stages are involved with identifying desirable and feasible changes and implementing them in practice. Mehregan et al. (2012) explained that feasible means whether is worthy or not to pursue a particular change. Checkland (1981) recommends reflecting in three types of changes as a result of final stages of SSM. Changes in institutional culture and structures, procedures, and the third one are concerned with changes in stakeholders' perceptions, expectations, and attitudes.

In a nutshell, SSM in Mode 1 contains seven explicit stages and is regarded as "a process of inquiry which, through social learning, works its way to taking action to improve (Checkland and Poulter, 2006, p. 192). It articulates and structures complex social processes in a particular regulated way (Por, 2008). Following the very structure of SSM, this approach helps the stakeholders to negotiate, renegotiate their perceptions in an organized manner, enabling the commonly agreed actions to be taken (Winter, 2006). The most important feature of SSM is the flexibility that allows the problem solver to pursue Mode 1 or Mode 2 (Turner, 2008), which will be explored in the following section.

1.5.2.2 SSM - Mode 2

According to Bulow (1989), SSM aims to improve areas of social concern by triggering a never-ending learning process in the people involved. The learning nature of SSM is the main distinction between Mode 1 and Mode 2 (Mingers and Taylor, 1992). They claimed that learning could easily be lost if the SSM is perceived as a prescriptive and linear methodology. Flood (2000) agrees with them and considers learning as the main activity of inquiry in SSM Mode 2. Mode 2 facilitates a better capturing of people's experiences regardless of where they are (Checkland and Winters, 2006). However, Bergvall-Kareborn, Mirijamdotter and Basden (2003) consider the move in Mode 2 unfortunate for beginners trying to learn the methodology. For them, Mode 1 is easier and provides clear details and direction for learning the SSM. But Turner (2008) sees the SSM Mode 2 as interactive, and the learning is created as shared knowledge of people working within an organization. It is widely known the holistic nature of SSM and Checkland and Winter (2006) underpinned three forms of analysis that make SSM Mode 2 a broader approach (Checkland and Poulter, 2006). They are:

Analysis one: known as intervention analysis aiming to improve the situation.

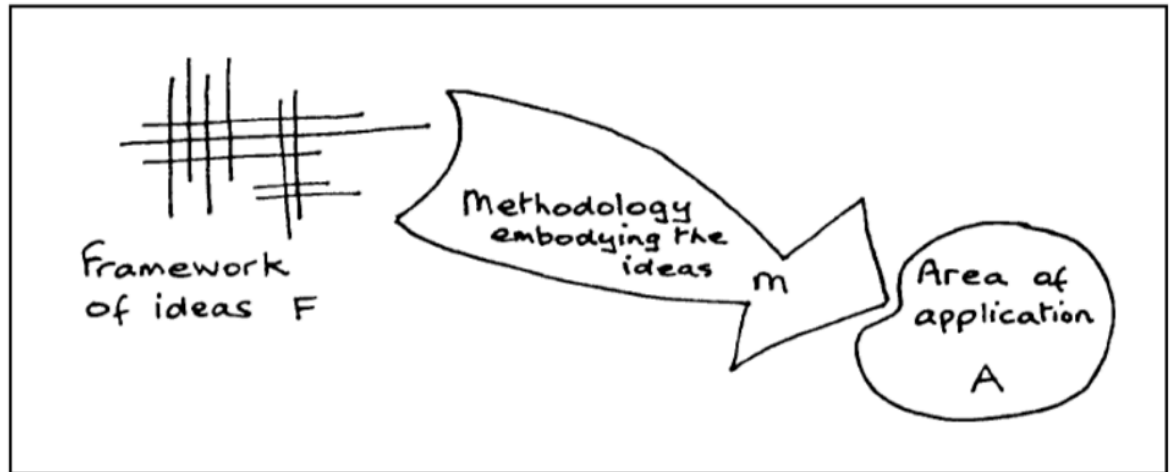
Analysis two: known as social analysis, focusing in understanding the social context to ensure the changes were culturally feasible for people involved in.

Analysis three: known as political analysis aiming to analyze the ownership and power among different structures (Barnden and Darke 2000).

Checkland (2000) thinks that social and political analysis alongside interventions analysis gives Mode 2 the power of being situation-driven rather than methodological. The researcher can still use seven stages independently or grouped in parallel, turning the SSM Mode 2 iterative rather sequential.

Figure 14

System thinking conceptual framework.



(Checkland & Scholes, 1990, p. 283).

According to Midgley (2003), there have been many attempts to synthesize the theoretical framework of system thinking in the form of general system theory. He argued that this framework should provide a concept open to change rather than some close structures defined by relationships to be successful.

Turner (2008) outlined that the value of Mode 2 is in carrying the inquiry before taking action stands in adopting a detached view of the problem under a more extensive analysis of the situation that could occur in common. In this context Ko, Tiwari, and Mehnen (2010) analyzed the general conceptual framework build by Checkland and Scholes (1990), as shown in Figure 14. They concluded that in Mode 1, the ideas (F) are generated in the assumption that the area of concern (A) is complex, which includes interconnected parts used by the SSM framework (M) to solve the problematic situation (A). Whereas Mode 2 facilitates logical streams as (F) that are used to reflect in activities in the area of concern. These reflections (M) are developed through interactions that help construct knowledge about the area of concern and, therefore, suggest proper improvements.

Hanafizadeh and Mehrabioun (2018) concluded that due to the commonality of SSM in tackling social situations, the benefits of using the SSM could be obtained in every area of applications. However, they argue that too many SSM applications are mostly focused on finding out and modeling rather than debating for feasible and desirable and taking actions. More discussion about SSM relevance and its impact on management research will be presented in the following section.

I.6 Importance of SSM in Organization and Management Research

According to Checkland and Poulter (2006), the objective of SSM is to build and guide purposeful actions by articulating different perspectives in a problematic environment, whereas the objective of interpretative research is to understand a particular phenomenon from the participant's perspectives (Walsham, 2006). For Mingers (2001), the ontological assumptions in interpretative studies are based on social phenomena that do not physically exist and are rather experienced, making them highly subjective because of the reality. Therefore, people's perceptions about reality change over time. The underpinning assumption of interpretative epistemological stance is that experience brings knowledge, and therefore, the social world is constructed through human meanings (Jackson, 2001).

Since the first appearances of SSM, Checkland (1981) links the SSM with action research, where knowledge is created because of the evaluation of interventions in the problematic situation. Action research are mostly interpretative (Meyers, 1997) and socially critical. Checkland (1981, p. 283) drops the critically philosophical flavor of SSM since it is less political.

Salner (1999) argued with Checkland and Scholes, claiming there is a mismatch between their ontology and epistemology. Sometimes they are constructivist or sort of subjectivist, showing a lack of coherent philosophical stance of SSM. However, some years later, Holst and Nidhal (2001) concluded in their study that SSM is grounded in an interpretative approach. In SSM, the reality is socially constructed, and meanings are formed, transformed, used to reinforce the interpretation nature of the reality. Ulrich (2013) noted that SSM is an interpretative method and shouldn't be confused with the intervening approach.

Mahalepa and Goede (2017) claimed that SSM could be used to articulate and understand the data from qualitative interviews. When analyzing the interviewee's data, the researcher can link the answers directly to SSM components for developing rich pictures, root definitions, and activity models. Therefore, they strongly recommend using SSM for data collection and analysis in interpretative studies. In response to some critics about the difficulty of implementing SSM, Checkland, and Scholes argued back that SSM doesn't require high analysis experience "SSM can work with whatever 'intellectual input' is available!" (1990, p. 10).

SSM has found many applications in today's organizations; for instance, in software development, Taylor et al. (2001) used SSM to analyze business requirements and Wen and Rajadorai (2013) to analyze stakeholder requirements. In education, Nair (2015) facilitated SSM to prepare curricula, courses, and learning environments. In project management, Joham et al. (2009) applied SSM to prepare project conception, Doloi (2011) to estimate exact project costs, whereas Sankaran et al. 2009 used to monitor and control different project phases. Pentland et al. (2012) leveraged SSM to share knowledge. Irrespective the wide array of successful SSM implementations, Hanafizadeh and Mehrabioun (2018) pointed out that most practical examples are concerned with understanding the problematic situation rather than improving

I.6 SSM as a research methodology

I.6.1 Inquiring Stages within SSM-Mode 2

When the audience asked Checkland (1999), "Where do I start with SSM?" the immediate reply was "Just begin." There is no start or finish point for SSM...it is a continuous process of learning and understanding, Flood (2000) argued.

The researcher applied Mode 2 of SSM as an organized learning approach to structure e his thinking when analyzing the data and constructing his knowledge about the issues he encountered during the evaluation of LSS applications in financial services. The division line between the real and system world in the original seven-stage SSM model was thought to be explicitly clear, but in fact, it was not. Hence, in attempts to remove this bias about SSM, Checkland and Scholes (1990) came up with SSM Mode 2:

Using SSM in mode 1, implies using SSM *'to do a study, or classically following the staged methodology for a problem intervention...i.e. mentally starting from SSM using it to structure what is to be done. This is in contrast to using SSM in mode 2, whereby it is acted out in the process of work and daily problem structuring, described as 'doing work using SSM...mentally starting from what is to be done and mapping it on to SSM, or making sense of it through SSM'* (Checkland and Scholes, 1999, p. 280).

They characterize the SSM Mode 2 as occurring events when the researcher becomes a participant by interacting with events that unfold over time rather than being external. Unlike Mode 1, Mode 2 (see Table 6) is situation driven. In contrast with other interventions that come from outside, managers or other employees working inside can

use SSM as an ongoing learning process (Gold, 2001).

Table 6:

SSM Mode 1 vs., SSM Mode2.

Mode 1	Mode 2
Method-driven	Situation-driven
Intervention	Interaction
Sometimes used only as a linear sequence	Always iterative
SSM as an external recipe	SSM as an internalised model

(Checkland and Scholes, 1990, p. A36)

Furthermore, SSM Mode 2 is interactive and helped the researcher improve his learning about the situations of LSS in financial services by sharing the experiences from all participants during the inquiry. For Turner (200), the value of carrying out a 'quick and dirty' SSM mode 2 inquiry prior to taking action is that the researcher has adopted a detached view of the situation and had the chance to perform a deeper analysis. The use of SSM Mode 2 enabled the researcher to identify several different perceptions about LSS projects and their framework. It allowed him to weigh and qualify key interactions among stakeholders, which were used to address a number of issues relevant to LSS methodology.

In this context, SSM Mode 2 comes for helping the researcher by leveraging its main feature of analysis- logic-based stream of analysis, which encouraged the researcher to investigate the situation, look for opportunities, and finding the way to accommodate the views and close the gaps among stakeholders in the financial services (Simonsen, 1994). The stream of cultural analysis is related to social and political analysis and is concerned with norms, values, political interactions, and the use of power to influence decision-making (Flood, 2000). More than a tool researcher regarded the experience of using SSM to explore LSS applications as an action-oriented approach to tackle the complexity of situations and diversity of different perspectives from all participants. He replied in four main activities (Figure 13) of SMM Mode 2, which consisted of 'finding out, 'modeling,' 'debating' and defining 'actions to improve' (Checkland and Poulter, 2010).

I.6.2 Finding Out- Perceiving the Situation.

Understanding various implementations of LSS in financial services was a complex task for the researcher, who paid a lot of attention at the initial phase for understanding and expressing the problem situation in a structured way. Identifying clients, actors, owners, structures, processes, and problem-solvers was the very first task. The process of inquiry of SSM began by expressing a situation through building a rich picture containing different issues, opinions, ideas of what was considered by participants involved as relevant about the situation as a whole in their LSS experiences (Checkland, 1981). The researcher deemed it necessary to clarify that he took the dual position in the current research: on one side as a problem solver aiming to evaluate the situation and on the other side as a client who prompted the research (Checkland and Scholes, 1990). Three types of analysis were available at this stage: analysis one *intervention or tackle the problem* helped the researcher to depict the situation in the form of rich pictures by showing by capturing the logic, culture, structure, processes, issues, and relationships among participants to perform the subject matter (Checkland and Poulter, 2006). The other two analyses, social and political, were critical for the researcher to grasp a flavor about the norms, values and establish the basic attention the culture of the organization (Checkland, 1999). He heavily reflected on those two analyses, but due to limitations on field research was not possible to fully follow. However, the researcher fully followed *intervention* analysis, where he managed to understand different aspects of social and political aspects of the investigation.

I.6.3 Developing Models

This stage is about constructing Purposeful Activity Model (PAM) or conceptual models. The researcher considered them very important devices 'to stimulate, feed and structure the debate' (Checkland, 1999b, p A21) about the implementations of LSS in financial services. The main tools that assisted the researcher in summarizing the root definitions and construct the conceptual models were CATWOE and performance measurements indicators (Checkland, 1998). The CATWOE is a mnemonic formed from the first letters of each element to define customer (c), actors (a), transformation process (t), Weltanschauung (worldview), owners (o), and the environmental (e) constraints.

A root definition is a single sentence that tries to capture the essence of the purpose or set of purposes relevant to the specific situation (Wilson and Van Haperen, 2015, p. 21). According to Checkland and Scholes (1990), the root definition and the transformation process are central to the construction of the conceptual models. They suggest that conceptual models essentially represent the minimum activities to enable the transformation to take place. Reflecting during the evaluation of LSS implementations, the researcher identified two types of Root Definitions (RD): Primary task root definition whose boundaries were coinciding with the real situation in the organization and issue-based root definitions whose boundaries were not falling within the organization and didn't represent a task or process that was existing.

They meant that it was relevant but hard to find (Checkland and Tsouvalis, 1997; Kangari and Sadri 1996). According to Wilson and Von Haperen (2015, p.38), the terms Issue-Based and Primary Task apply to the types of Root Definitions (RD), but they also apply to conceptual models (CM). The main distinction between them is that Issue-based has temporary relevance and is not expected to map on to organization boundary. Primary Task has permanent relevance and is expected to map on organization boundary. The researcher followed the Checkland and Poulter (2006) triple Es criteria when building the conceptual models:

Efficacy—is the transformation, represented by the activities in the conceptual model, producing the output?
Efficiency—are the minimum resources used to obtain the output of the transformation process?
Effectiveness—does the transformation meet the longer-term goal(s) as put forward in the Weltanschauung?

The researcher drew each activity in the conceptual model in the form of bubbles and arrows connecting them to show the relationship between different activities (Simonsen 1994). He used in the first instance a set of 'verbs' necessary to describe the actions of the human activity systems, which was seeded in a relevant system, and grown in the root definition of the primary task. The 'verbs' were ordered systemically, drawing out the feedback loops that described the interactions of the human activity system and used as measurement tools to validate the changes Flood, R. L. (2010). The researcher considered feedback loops as the most important elements in conceptual models since they enabled him to measure the transformation's success and ultimately validate the

findings (Gasson, 2021b). The researcher identified and applied two types of feedback loops:

a-) External feedback loop, the distance between input and input, that allowed him to manage and assess the primary task. This distance could be translated into time KPIs, cost reduced or profits KPIs

b-) Internal feedback loops helped the researcher to assess how different human activities or actors within the whole conceptual model were performing

Hindle and Franco (2009) highlighted that when building PAM or conceptual models, the researcher should consider four types of design models. Building a baseline model (or AS IS) descriptive model of the current process or product under investigation to help the participants assess the fundamentals of current arrangements. The other model is to create design models to create new designs or alternatives. The third is a theoretical model, a pure world view of the theoretical position and articulates it through a system design. The final one is to build temporary conceptual models to achieve short-term objectives. Here, the final model that the researcher preferred is input – Transformation-output, and each activity is used to trigger participants' ideas for future improvements.

Once the researchers set the stage with root definitions for the primary task and issues-based problems, constructed the respective conceptual models, he moved to the final stages of SSM Mode 2 related to '*debate*' and '*take action*' (Checkland and Winter 2006).

I.6.4 Debating and Take Action

Comparing Real World with System Models

Checkland (1981) describes the real-world comparison with the system world as a confrontation of 'whats' with 'hows.' The system models are abstract descriptions and describe activities that logically must be performed in the system (whats). Whereas in the real-world activities always will be one way of doing things, "one how related to a what which is usually implicit rather than explicit (Checkland, 1981, p. 228). In this stage, the researcher brought together all participants' opinions to debate about the existing situation and how to improve it. According to Checkland and Poulter (2006, pp. 227-229), there are four ways to question or investigate reality. The first approach suggests using the PAM as a reference and locating its differences and the present situation. A second approach, which is the most common, suggests creating a matrix with columns. In the left column of the matrix, whether the activities exist or not, other column performance indicators and dependencies.

In contrast, the filled matrix will help the researcher answer the question. Another approach could be writing stories of how some activities should be done and comparing them with real-world situations. The last approach is building a new conceptual model and comparing it with the prepared conceptual model to identify the differences. Regardless of the approach chosen, the researcher's intention remains the same to accommodate the different worldviews and to find a common and agreed way for the problematic situation (Chatzipanagiotou, 2014). Feedback loops defined earlier on helped the researcher debate using conceptual models as a reference from where and how the changes should happen (Checkland, 1999b). The researcher had to revisit stage one to find the adequate accommodation between participants and checked all activities in conceptual models with the suggestions from all stakeholders to determine the exact differences (Hindle, 2011).

Taking action in the research involved process changes to tackle the problems encountered during LSS implementation and addressed some of issue-based problems such as project-based, training, and motivation. According to Kotiadis et al. (2013), the debate at this stage aims to seek both changes, which could improve the situation and are regarded as both desirable and feasible, and accommodations between conflicting interests, which will enable action-to-improve to be taken. Checkland describes the possible changes within three categories: changes in structures, procedures, and 'attitudes', including, e.g., changes in influence, expectations, roles, etc. (Checkland 81, pp. 180f). In the following sections, the researcher explains the entire data collection process, starting from the rationale of the research sample and methods used to acquire and analyze data acquired from participants.

I.7 Appendix Summary

The aim of Annex I was to review the literature of systems thinking principles, SSM, underpinning the theoretical background it came from, its classes, and its importance in organizations and management research. It started with an extensive overview of the system-thinking label, which came into life as a need for dealing with growing complexity in the natural and human sciences. Then explored the contribution of system thinking in OR where soft thinking emerged as the opposition of the hard system thinking approach, reviewed the contribution in Management Science with its interpretative philosophical stance. The researcher brought forward the differences between hard and soft system thinking alongside discussions about the soft system

thinking approach and its different frameworks. The review moved on to SSM as a method that provides a holistic view of any given complex situation. Different discussions were used to introduce and summarize the main modes of SSM (SSM Mode -1 and SSM Mode -2) and their respective features. While Mode 1 was more related as a problem solver and Mode 2 was more learning oriented. SSM as a research methodology in the current study closed the chapter where the reader can how the SSM was applied through the research. References in the appendix can be found in the reference chapter for the whole thesis.