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BUSINESS INTELLIGENCE FOR DECISION SUPPORT IN SANCTIONS

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Master of Science Thesis

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ABSTRACT

Abdullah Israr: Business Intelligence for Decision Support in Sanctions

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Sanctions are evolving continuously because of the global landscape, and it has increased significantly in the recent years. Financial institutions around the world are adapting to the changing need of sanctions compliance and regulatory requirements by ensuring effective screening in place using advanced technologies to navigate compliance issues. This thesis explores the use of business intelligence as a decision support tool in sanctions. This study is performed and presented a case study of a financial institution that deals with sanctions compliance.

The research conducted through qualitative case study using semi-structured interviews. The use of business intelligence improved decision making, fosters collaboration and streamlines the sanctions screening process. Additionally, this study shares the findings related to challenges in the integration of business intelligence in sanctions. A notable gap is identified in the existing literature on the utility of business intelligence in sanctions compliance, generating a need of research on how business intelligence can support financial organizations in complex sanctions landscape. The findings further discuss the future role of business intelligence in sanctions with an integration of artificial intelligence to enable data-driven decision making in the evolving sanctions landscape.

Keywords: Business intelligence, Sanctions, Screening, Decision making, Artificial intelligence, Analytics, Compliance, Regulations

The originality of this thesis has been checked using the Turnitin Originality Check service.

PREFACE

This thesis is a case study of a financial organization leveraging business intelligence in managing sanctions risks and compliance. The motivation behind choosing this topic is my fascination with sanctions and how it applies at organizational level. The current global scenario which contributes to the rise of sanctions has further aroused my interest to pursue my research in this topic.

The journey to complete the thesis has been challenging because of the sanctions data confidentiality but at the same time it was rewarding to work with resources in hand to provide an effective analysis of the case study. I'm immensely grateful to my supervisors Associate Professor Hongxiu Li and Professor Martti Juhola for guiding me at every step and addressing my queries with patience. Their feedback has been instrumental throughout my thesis journey, helping me significantly in my growth.

Special thanks to my manager Marianne Schalin for the encouragement, supervision and taking a lead in getting all the required permissions in conducting interviews in the case study organization. I want to express my gratitude to the professionals who shared their time and knowledge which contributed to showing the real-world perspective to the academic research.

I'm deeply thankful to my parents and my beloved sister for their unwavering support and prayers throughout my thesis journey. Last but not the least I want to thank all my friends Wajhee, Munim, Sana, Owais, Zunair and Mishal who were there to encourage me and help me whenever needed. Big thanks to my friend Bakhtawar for her continuous support, wholesome reminders and pep talk during my thesis journey.

I hope this thesis will make a valuable contribution in the academic research and will provide future avenues of research in the integration of business intelligence in sanctions compliance.

Tampere, 16th April 2024

Abdullah Israr

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LIST OF ABBREVIATIONS

AI	Artificial Intelligence
AIDS	Analytical and Intelligent-decision support
BI	Business Intelligence
EDMT	Enhanced decision-making tools
EI	Providing experiments and environmental information
ELT	Extract, Load, Transform
ETL	Extract, Transform, Load
EU	European Union
HOLAP	Hybrid Online Analytical Processing
KYC	Know Your Customer
MOLAP	Multidimensional Online Analytical Processing
OFAC	Office of Foreign Assets Control
OLAP	Online Analytical Processing
ORM	Reasoning, Optimization and Recommendation
ROLAP	Relational Online Analytical Processing
SDNs	Specially Designated Nationals
UK	United Kingdom
UN	United Nations
US	United States

1. INTRODUCTION

1.1. Background

Sanctions are the steps taken by countries or international bodies in response to policies adopted by other countries, entities or individuals which violate international laws and agreements. It is also used as a diplomatic pressure tool to influence a decision of a target country (Drezner, 2003). Governments and international bodies place restrictive measures on a target country. The common type of sanctions includes economic sanctions, immigration sanctions, trade sanctions and sectoral sanctions. Sanctions have changed over the period and with the changing nature there was a need for sanctions screening to ensure compliance with international sanctions.

Sanctions screening is a systematic process to check certain individuals, entities or regions against sanction lists maintained by international bodies or governments. Sanctions screening is done to prevent any sort of interaction with the sanctioned individuals, entities, or regions (Wolfsberg, 2019). It helps mitigate risks and ensure compliance. Financial institutions, especially banks, rely heavily on sanctions screening because they can face severe penalties in case of non-compliance with regulatory requirements. Screening triggers an alert in case of match is found that can be potentially linked to the sanctioned individual, transaction, entity, or region against the sanction list. After an alert is generated, it requires further analysis of data to check if the alert is a true match or a false positive. An effective sanctions screening is important for financial institutions to avoid regulatory fines (Gorny, 2022). Many organizations spend a lot of money on an effective sanctions screening process.

To evaluate effectiveness Business Intelligence (BI) can be leveraged to enhance sanctions screening capabilities. The role of BI in organizational decision making and its impact studied by (Hurbean et al., 2023) supports that BI positively impacts decision making. Sanctions domain relies heavily on data and BI is used to make sense of the data to provide an overall picture. According to global sanctions database (Syropoulos et al., 2020, 2021,2022), sanctions have increased and changed continuously that creates a need for BI system to collect, transform and analyze the data in real time providing insights to facilitate effective decision making.

The integration of BI into sanctions not only facilitates the data driven decision making but can also contribute towards increasing the overall efficiency of sanctions compliance process as (Rouhani et al.,2016) discussed the impact of BI in process efficiency in organizational outcomes.

1.2. Research Focus

The main objective of research is to study the role of BI in sanctions, its screening and management and how it evolved over time. The aim is to focus on the application of BI and how it helped make sanctions screening process more effective. This research will highlight the importance of a robust framework of BI in an organization to make the sanctions management process more efficient and accurate. This study will provide further direction that how BI is helping financial institutions to take data driven decisions for sanctions.

RQ1: How does BI enhance decision making in sanctions compliance and what are additional benefits associated with it?

RQ2: What are the challenges associated with implementation of BI in sanctions and what type of role it will play in the future of sanctions?

1.3. Structure

To address the research questions, structure of the thesis is designed as follows: Chapter 2 to 4 sets the base of the study highlighting the overview of the research study and introducing the main themes of BI, sanctions and decision support.

Chapter 1 lays the groundwork by highlighting the significance of BI with respect to sanctions. Chapter 2 dives into the literature review covering the overview of BI, sanctions, decision-making process along with data applications in sanctions. Chapter 3, elaborates the methodology employed in the study, including data collection and analysis. Chapter 4 shows the results and findings of the methodology used for the case study. Chapter 5 summarizes the findings, discusses the potential contributions to the field, acknowledging the limitations, and proposing areas for future research. Chapter 6 concludes the thesis with overall findings, future outcomes and closing remarks.

2. LITERATURE REVIEW

The need for an effective sanctions screening system has become a crucial requirement of organizations to ensure compliance. To have effective sanction screening system organizations are looking to leverage BI techniques to make informed decisions based on data. BI provides data-driven insights to help businesses make timely and informed decisions. It provides a clear picture of effectiveness of a process in terms of sanctions screening. The literature review focuses on how BI evolved over the period and what are the use cases in which organizations can leverage BI techniques to provide support in decision making. It also aims to explore the utility of data analytics in sanctions domain.

2.1. Overview of BI

“BI refers to the process of gathering, analyzing, and visualizing data to provide insights that inform business decisions.” (Cekuls, 2023, p. 4)

“BI”, “Data Analytics” “Big Data” and “Data Mining” are the buzz words that have gained significantly over the past years. The reason being that data generated over the last 13 years has been estimated to be increased 60 times from 2010 shown in Figure 1.

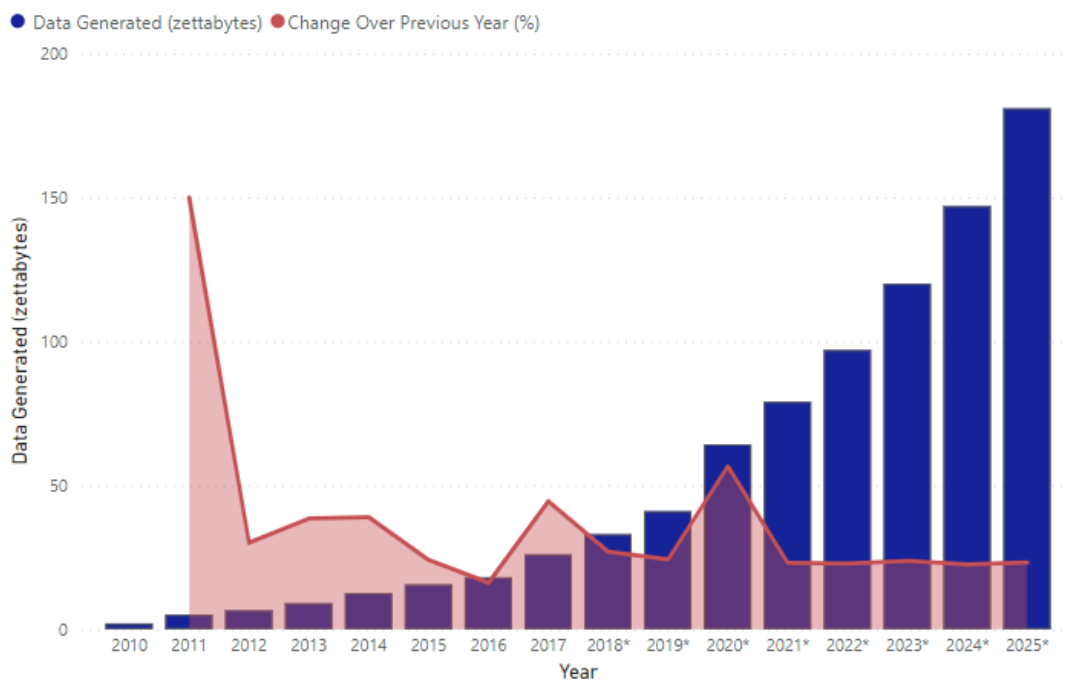


Figure 1. Global Data Generated Annually (Duarte, 2023)

The projected data for 2025 is expected to be increased to 181 zettabytes around 150 times more (Duarte, 2023).

So, organizations, government and research institutes leverage data to generate key insights. Data has become a most important entity as it drives businesses, based on that you can identify trends and make decisions accordingly. Organizations and Governments spending a lot of money to utilize data as much as possible and this led to a rapid growth of BI. BI works with current and historical data. It shows real time insights based on current data and identifies trends based on historical data which helps organizations to make smart decisions and develop new strategies. Figure 2 shows a general overview of BI and its applications across different dimensions.

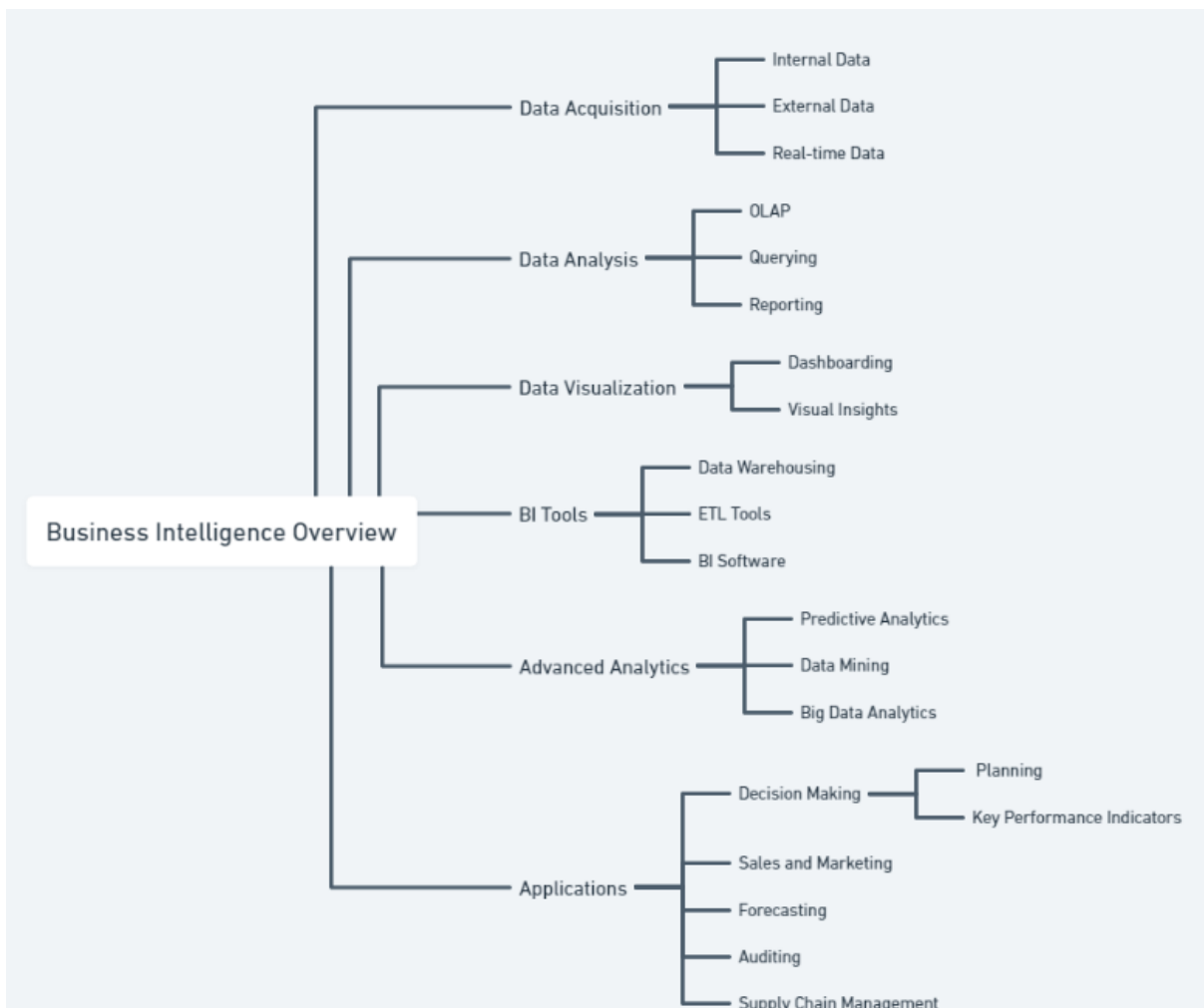


Figure 2. Overview of BI (Sikarwar, 2020)

Data stored by organizations is heterogeneous in nature which can contain images, links, reports, hyperlinks, free text, and numbers as well so to process this different form of data it created an opportunity to have technologies that can process this data and transform into something meaningful that can help make informed decisions.

For example, according to Facebook Statistics 2020 (Osman, 2022), data generated by Facebook is 4 petabytes which is equal to million gigabytes. It is difficult to calculate the amount of data held by big tech giants like Google, Facebook, Amazon, and Microsoft but it is estimated that the big 4 have at least 1200 petabytes of data between them (Gareth, n.d.). This is where a new term “Big Data” introduced for large amount of data. Big data in simple terms is a large and complex amount of data which is difficult to handle with tools that do not have the capability to process this data. It constitutes of both structured and unstructured data which is characterized by data velocity, data variety, and value of data. The utilization of Big Data has expanded the capabilities of BI, enabling organizations to gain deeper insights into their customer base, enhance marketing strategies, enable personalized experiences, and promptly identify both challenges and advantageous situations in real time. The growing attention toward Big Data stems from its potential to generate substantial market value due to these abilities. Big Data does not only mean a large amount of data; it is also how organizations utilize this data to draw insights, do forecasting and devise strategies. Specialized tools and technologies are required to process and analyze Big Data. Hadoop is one common example that handles vast amounts of data. Like Big Data, it is analytics itself in another dimension that has lot of value and is considered as a separate field to explore how effectively Big Data analytics can be utilized to derive key business decisions. For example, PepsiCo, is a big food and drink company that you can find in over 200 countries around the globe. To ensure consumers are getting the right products and quantities in certain locations they used a targeted consumer approach using Big Data and predictive analytics. It identifies customers in United States using -based data and analytics platform called Pep Worx to show their interest in specific PepsiCo brand or product. By using this approach, they were able to maximize the product sales growth to 80% in the first 12 months (Gavin, 2019).

BI systems are based on business needs and the definitions may vary depending on the need, but in general all BI systems consist of a minimum of four key components to provide intelligence. There four key components are (1) data warehouses, (2) ETL (Extraction Transformation Load) tools, (3) OLAP (Online Analytical Processing) techniques and (4) data mining (Olszak & Ziemba, 2006). Figure 3 shows the main components of a BI system.

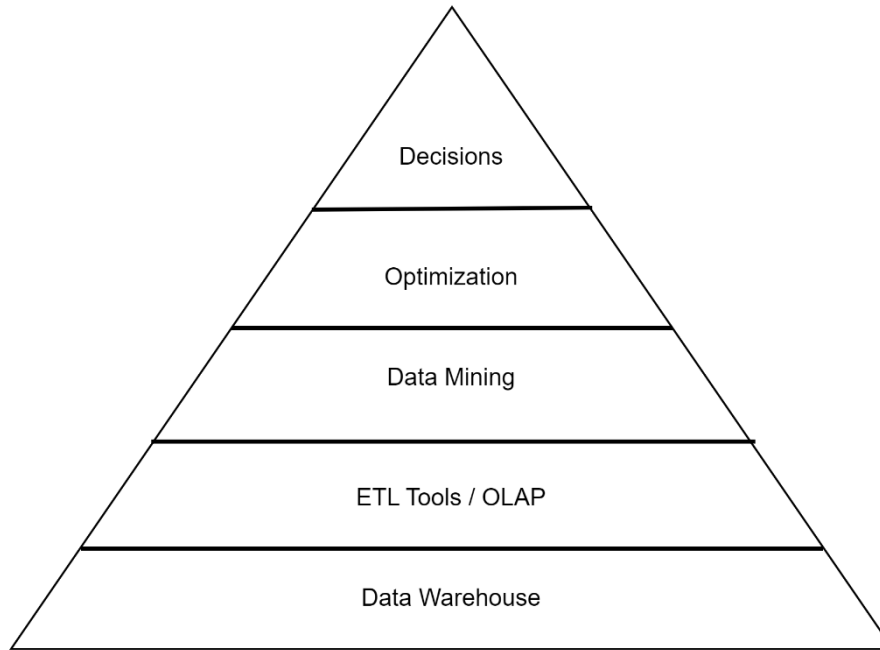


Figure 3. The main components of a BI system (Vercellis, 2011)

A **data warehouse** is a centralized data repository which is organized and structured systematically to give the ability to analyze data for decision support. Data warehouse contains data from multiple data sources that can be diverse in nature helping organizations to have one data source system where data from different departments can be stored and interact with each other using unique identifiers. Data is then extracted and cleaned to perform analysis by using entity relationship which serves the purpose for decision making. They are snapshots of data at a certain time and are time bound which means they could be offline and online based on organizational needs. Offline data warehouses are sufficient to perform historical data analysis while for real time analysis an online data warehouse is needed. ETL tools transfer data from management systems to data warehouses, which helps in thematic storing of aggregated and analyzed data (M. Olszak & Ziemba, 2014).

ETL tools operate on the principle of extracting data from multiple source systems, then reshaping the data by transforming into one common format, and then loading it into a data warehouse.

1. Extraction (E):

In this stage, data is extracted from multiple sources that are usually heterogeneous sources. During extraction, data is also checked for accuracy and consistency.

Extraction also involves profiling the extracted data for any anomalies. Most of the advanced BI tools have this built-in feature.

2. Transformation (T):

In this stage, transformation of data takes place to structure the data in a way that it matches that target data repository format. It includes cleaning of data, data type changes, structural changes, and matching format.

3. Load (L):

After the transformation of data, now it is time to load that data into the target system. Some applications use the feature of data aggregation to load data quickly and can be used instantly to generate insights.

There is another method of processing data which is similar to ETL and it is called ELT (Extract, Load, Transform) (Singhal & Aggarwal, 2022). The difference from ETL is that in this method you extract data, load it and do the transformation after loading.

OLAP is a technology used to perform BI operations and help organizations in decision making. It optimizes the process when dealing with large amounts of data for analysis from multiple dimensions (Vercellis, 2011).

The components of OLAP described by (Biscobing, 2020):

- **Cube:** A cube is a fundamental data point that consolidates and organizes data measures based on the dimensions used for analysis. The dimensions can cover various aspects of like time, geography, and other categories, while the data within the cube is typically summarized, such as sales or inventory data.
- **Measures:** Measures are sets of values that are subjected to preprocessing, aggregation and analytical processing derived from columns within the cube.
- **Dimension:** Dimensions are organized hierarchically and are populated by members for example geography may contain hierarchies for "Country/Region," "State/Province," and "City."
- **Hierarchy:** Hierarchies are logical tree-like structures that organize members within a dimension.

Organizations use OLAP to process huge amount and there are 3 OLAP technologies that are very useful as follows (Nanda et al., 2019):

1. **MOLAP (Multidimensional Online Analytical Processing):** MOLAP is a type of OLAP that stores data in a multidimensional cube structure, separate from relational databases. It often requires pre-calculation and storage of aggregated data in data cubes.
2. **ROLAP (Relational Online Analytical Processing):** ROLAP directly interacts with relational databases and does not necessitate extensive pre-processing of data. It operates by manipulating the data within relational databases to provide OLAP's slicing and dicing functionality.
3. **HOLAP (Hybrid Online Analytical Processing):** HOLAP combines both the properties of MOLAP and ROLAP. It offers a hybrid approach to balance the trade-off between ETL costs and query performance by determining which data can be placed in MOLAP and ROLAP storage structures.

Data mining is the process of analyzing large amounts of data to provide actionable insights to organizations to improve their business and focus on areas that can yield more value and profit (Bose, 2009). Data mining deals with more detailed information rather than summarizing it. The difference between OLAP and Data mining is former forecasts and later predicts. Both can be used for the analysis of marketing data, financial data, customer data, personal data, production data and logistical data (Lloyd, 2011). In BI, data mining does tow way job. It does not just help understand and evaluate data analysis results from the data warehouse. It also creates reports that let decision-makers find different patterns and common trends (M. Olszak & Ziemba, 2014). The most common strategies of data mining are: Classification, Association Rule Mining, Clustering, Regression Analysis, Text Mining, Anomaly Detection, Time Series Analysis (Li Zeng et al., 2006).

Optimization is on the second level right after decisions in a pyramid above shown in Figure 3. In the BI system, it serves as a key component to help in decision-making, performance and resource allocation based on optimization models (Vercellis, 2011). There are different kinds of optimization models based on different kinds of data. The whole purpose of it is to find the best solution which can increase efficiency, reduce costs, and improve performance.

Decisions. At the top of the pyramid is the decision-making process, there is the actual choice and implementation of a specific decision. Even if there are good BI methods in use,

the final decision still depends on the decision-makers. They might also use informal information to tweak the recommendations and conclusions that come from mathematical models (Vercellis, 2011).

2.2. Overview of Sanctions

Sanctions are defined as “restrictive policy measures that one or more countries take to limit their relations with a target country in order to persuade that country to change its policies or to address potential violations of international norms and conventions” (Morgan et al., 2009, p. 3).

Sanctions are a fundamental aspect of global diplomacy, employed to pressure specific governments into taking certain actions (Hufbauer, Schott, & Elliott, 2009). They can serve various objectives and manifest themselves in different ways. (Morgan et al., 2023) discussed that sanctions have been utilized as a tool to support democracy, enforcing human rights, combat terrorism, nuclear proliferation, destabilize regimes, and expedite the termination of armed conflicts. Sanctions imposing states aim to limit trade or foreign assistance in any form with the targeted state, but measures can also include constraints on travel, freezing assets and preventing specified individuals or groups from accessing financial institutions (Morgan et al., 2023).

Sanctions are unilateral or group of measures aimed at influencing the conduct of individuals or governments, serving as a mechanism to prevent a country from violating the rules established by the international community (Kressler et al., 1985). Sanctions have been used as a pressure tool throughout history to punish individuals or countries. One example of sanctions from old times is when Athens imposed an embargo on Megara region to block their trade activities. Sanctions became more common in recent history, particularly between 1800 and 2000 (Mechiev, 2019). A significant turning point was after World War II when the United States became the first country that utilized economic measures as a means of pressuring other countries to stop them from military action (Goncharenko, 2020).

Before the establishment of the United Nations in 1945, there were no regulation bodies overseeing sanctions. Nations that are powerful can put sanctions on weaker countries without restrictions, as seen in the case of Libya enduring over 30 years of sanctions. But later the UN took control so now sanctions are subjected to international law. This legislation also listed

circumstances under which legal sanctions could be imposed, preventing the sender country from facing international repercussions (Naumova, 2019).

As per EU (European Union) (Council of the EU and the European Council, 2023), these are different types of sanctions:

- Diplomatic Sanctions
- Economic Sanctions which also include trade sanctions
- Asset Freezes
- Travel bans
- Arms Embargo

In recent years, economic sanctions have gained significance as a crucial tool in economic statecraft. These methods of conflict resolution enable nations to apply pressure on others by imposing economic penalties (Figuerola, 2015). (Hufbauer, Schott, & Elliott, 2009) in their book *Economic Sanctions Reconsidered* provide a comprehensive view of economic sanctions. The authors evaluate how effective economic sanctions are in achieving objectives related to foreign policy. They analyze the factors influencing the success of these sanctions and weigh the advantages and disadvantages for both the country imposing sanctions and the target country. In historical context, economic sanctions are often linked to the sender country's desire to influence the process of decision-making of another state's government. Economic sanctions are getting more popular because they are seen as a less expensive option compared to war, particularly when diplomatic efforts fall short (Hufbauer, 2007). This is especially relevant considering the high costs associated with military action. As technology in warfare advances, and the potential for existential threats from weapons of mass destruction grows, there is a rising trend towards relying on alternative statecraft methods, such as economic sanctions (Figuerola, 2015).

Sanctions have evolved a lot in the last decade as (Morgan et al., 2023) also observed a significant increase in sanctions over the last decade as a foreign policy tool. (Morgan et al., 2023) discussed the evolution of sanctions post World War II in the context of current economic and international political landscape, and it is majorly influenced by global political and economic orders. They utilized the global sanctions database (Felbermayr, Kirilakha, Syropoulos, Yalcin, & Yotov, 2020) which is their third release, and it contains the data on 1325 sanction cases from the period 1950-2022. Global Sanctions database has classified the sanctions across 3 major dimensions which is sanction's objective, sanction type and sanction

success. So, for sanctions type it can include travel sanctions, financial sanctions, trade sanctions, diplomatic sanctions, arms sanctions, and any others which do not lie in these categories can go to other sanctions. The objectives of sanctions as per (Morgan et al., 2023) classified into nine categories influencing policies, destabilizing regimes, resolving territorial conflicts, combating terrorism, averting war, concluding ongoing conflicts, reinstating, enforcing human rights, reinstating, strengthening democracy, and other specified objectives. Based on Figure 4 there is a trend that shows a steady increase in the rise of sanctions in the last 70 years which highlights active sanctions increases almost 10 times per year than there were in 1950. The sharp increase in 2022 is the result of global sanctions on Russia from US, UK, and others. The initial purpose was to forced Russia to stop invading Ukraine but when it failed to achieve required purpose more sanctions were imposed as a form of punishment for Russia, to provide support for Ukraine in war times and to put pressure on Russia to stop the invasion. Global Sanctions Database release 3 has added an important update related to a variable that can distinguish between unilateral and multilateral sanctions (Syropoulos, Felbermayr, Kirilakha, Yalcin, & Yotov, 2022).

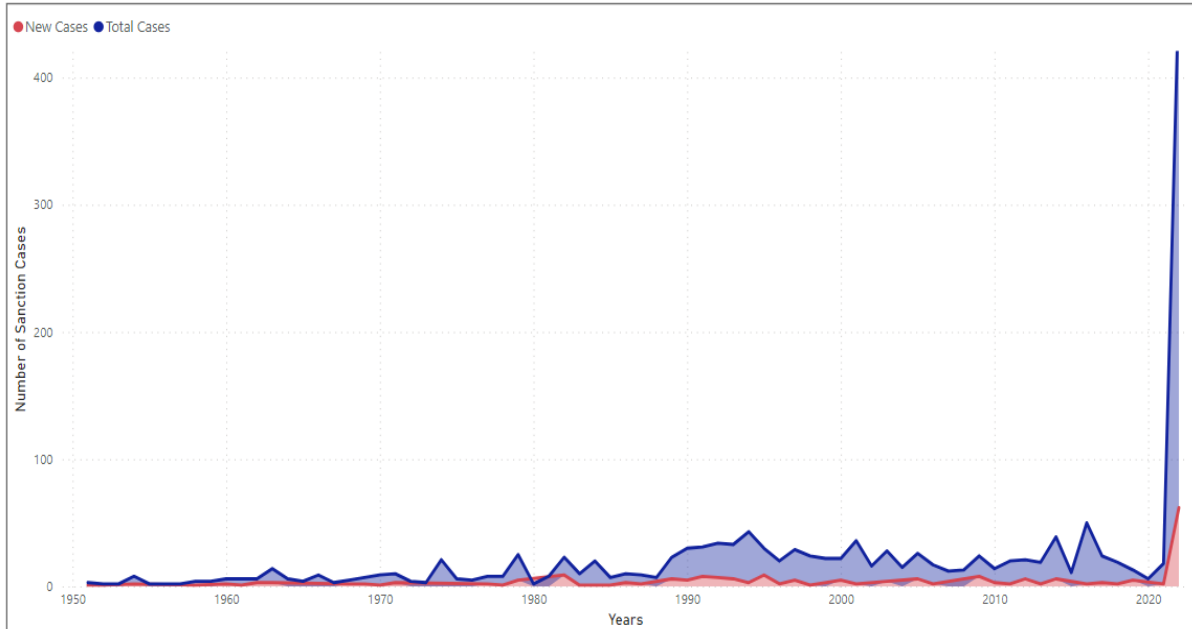


Figure 4. The changes in both ongoing and new cases of sanctions from 1950 to 2022. Source: The author generated this figure using the full sample dataset from the third release of the Global Sanctions Database.

(Syropoulos, Felbermayr, Kirilakha, Yalcin, & Yotov, 2020, 2021, 2022)

In Figure 4, it can be clearly seen that evolution of ongoing cases increased continuously throughout all the years but in 2022 they increased significantly along with new cases. The total number of cases grew sharply in 2022 which covers 49% of all the cases from 1950 to 2022 and similarly new cases also constitute 28% of all new cases.

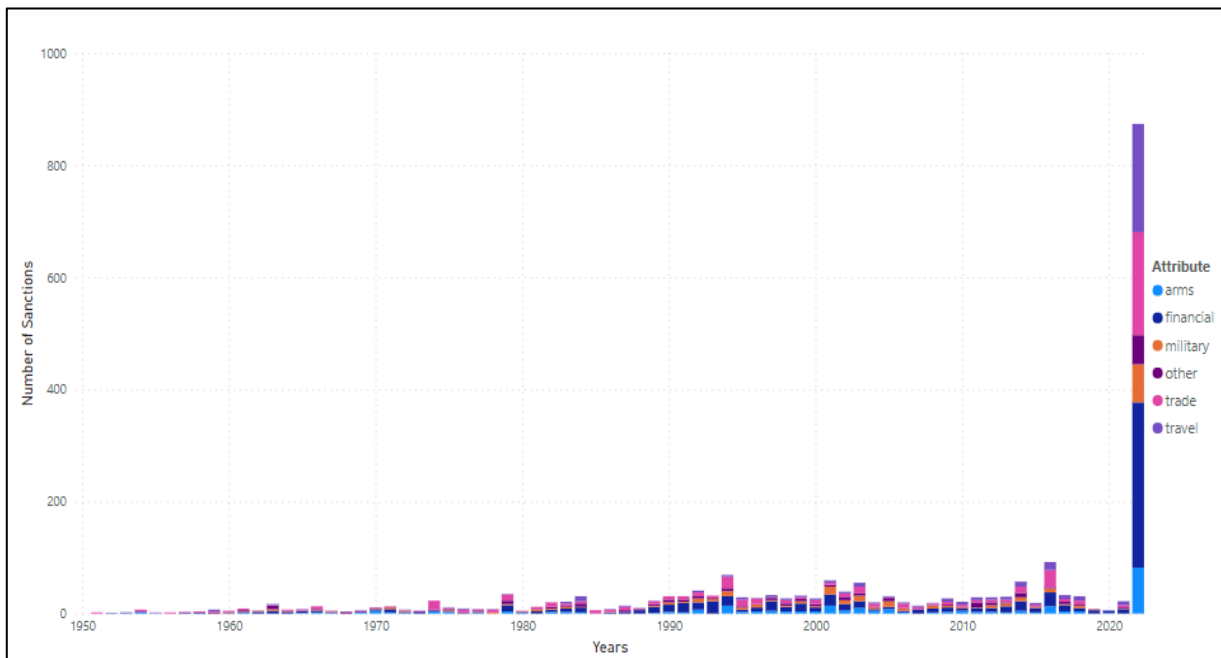


Figure 5. The evolution of sanction cases from 1950 to 2022 by Attribute. Source: The author generated this figure using the full sample dataset from the third release of the Global Sanctions Database. (Syropoulos, Felbermayr, Kirilakha, Yalcin, & Yotov, 2020, 2021,2022)

Sanctions are rules and/or restrictive measures formulated by governments, companies, organizations, and individuals from blocking any financial activity with the individuals, entities or organization that are suspected of committing criminal activity. A list of such individuals or organizations makes a sanction list. Many international bodies and organizations such as the EU, OFAC (Office of Foreign Assets Control), UN (United Nations) and others have published their own sanction lists which apply to anyone that is directly or indirectly linked with them. In case of failure to compliance, organizations and individuals can face severe penalties and in extreme cases legal battles as well. Sanction screening is a set of controls that is focused on preventing and mitigating financial risks for institutions (Ranaweera et al., 2022). This facilitates organizations to track and identify sanctioned entities, individuals, and

organizations. In addition, it also uncovers areas of possible sanctions risks and helps in sanctions compliance (Ranaweera et al., 2022).

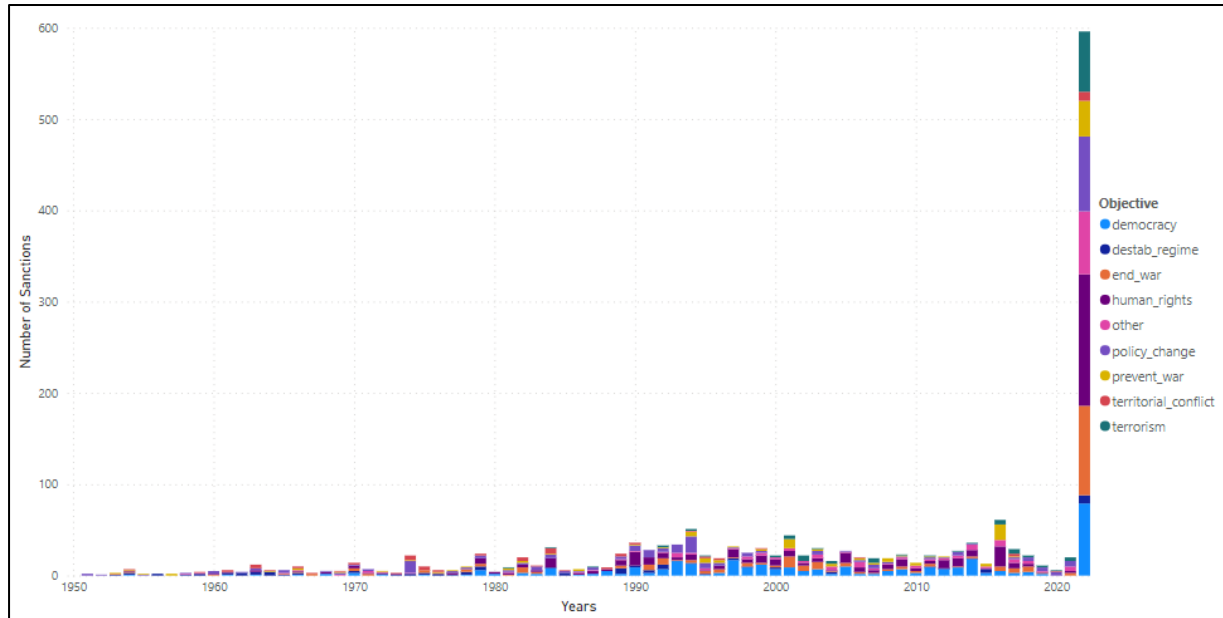


Figure 6. The evolution of sanction cases from 1950 to 2022 by Objective. Source: The author generated this figure using the full sample dataset from the third release of the Global Sanctions Database. (Syropoulos, Felbermayr, Kirilakha, Yalcin, & Yotov, 2020, 2021, 2022)

To understand sanctions more, we need to understand the sanctioned person and sanction entity. According to section 50 USC § 4611(e)(3) in 50 U.S. Code § 4611 - Multilateral Export Control Violations, (1988), “the term “sanctioned person” means a foreign person, and any parent, affiliate, subsidiary, or successor entity of the foreign person, upon whom sanctions have been imposed under this section”. OFAC (U.S. Department of the Treasury, n.d.) publishes a list of individuals or organizations that are controlled or owned by targeted sanctioned countries. This list comprises of all individuals, entities, groups, and companies designated under programs are called "Specially Designated Nationals" or "SDNs." They are prohibited to do business with US people and their assets are blocked as well. Government institutions such as OFAC, UN and the EU impose sanctions but to implement them and make it compliant with regulations is the job of financial institutions. They are obligated to have a system in place where they screen customers and transactions data to find any possible sanctions risks. According to (Wolfsberg, 2019), sanctions screening is a technique that financial institutions use for reviewing customer and transactional data to identify potential

risks and ensure compliance with regulations. This analysis includes procedures to query structured data like Know Your Customer (KYC) information and unstructured data from various sources, such as product documents and customer notes.

2.3. Decision Making Process

“Decision-making is the process whereby an individual, group or organization reaches conclusions about what future actions to pursue given a set of objectives and limits on available resources” (Schoemaker & Russo, 2014, p.397).

Decision making is an important process in every organization to identify problems, discuss solutions, analyze impact, and choose reasonable actions. It is crucial to choose among different alternatives and make the best possible decision (Gupta & Kulkarni, 2022). In organization decision making, it is critical to analyze different scenarios, their impact, cost effectiveness before taking a decision. Organizations have think tanks that do all the research before deciding on something which shows how much organizations focus on decision making process. It involves evidence-based decision making that enables critical thinking and a structured approach to come to an important decision (Capezio & Patrick L'Espoir Decosta, 2023). Below is the general structure of decision making in Figure 7.

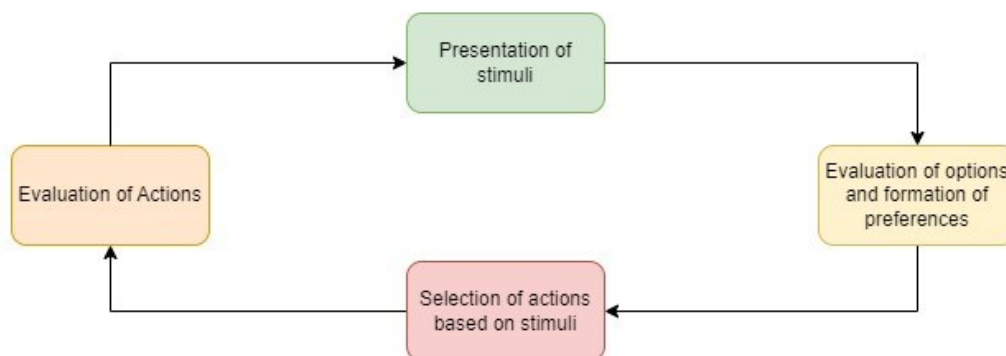


Figure 7. General structure of decision-making (Ernst & Paulus, 2005)

Organizations rely on different methodologies to facilitate decision-making processes; BI is one such methodology that management relies heavily on these days to make a data driven decision. BI provide information that is consumed in multiple ways some of them rely on visual

insights or in tabular form of data, or some use reporting as a tool (Negash, 2004). The main goal of BI is to facilitate informed decision making which leads to enhanced performance of the organization (Vishnu Vinekar, Teng, & A. Chennamaneni, 2009). (Il Sun Ko & Sarvar Abdullaev, 2007) described that due to lack of integration of BI in decision-making process, around half of BI implementation failed to achieve relevant outcomes to influence decision-making in a significant way. (Pourshahid et al., 2014) discussed in detail a goal-oriented methodology that focuses on organizational goals and connects them to decision-based model and relevant key performance indicators which improved the decision-making process. (Rouhani, Ashrafi et al., 2016) analyzed the relationship between different BI functions and their effect on decision support benefits along with organizational benefits. They came up with proposed model which contains 5 main BI functions namely Analytical and Intelligent-decision support (AIDS), Enhanced decision-making tools (EDMT), Reasoning, Optimization and Recommendation (ORM), Providing experiments and environmental information (EEI), Decision support benefits includes better knowledge processing, reduced decision time and cost and organizational benefits which contains effective decisions, competitive advantage and stakeholders' satisfaction This study provided a holistic understanding of which BI functions have a great impact on the outcome benefits for decision-making in organizations.

2.4. Integrating Business Intelligence in Sanction-Related Decision Making: A Gap Analysis

This section delves into the current state of research on application of BI for decision support in Sanctions. After reviewing the existing literature, it is evident that there is a substantial amount of literature on BI role in decision making at an organization level (Olszak & Ziemba, 2006), role of sanctions in international compliance (Figuerola, 2015) and guide for effective sanction screening where data quality and other screening related challenges are highlighted (Gorny, 2022) , yet a noticeable gap exists when it comes to application of BI in sanctions. The role of BI in sanctions as a decision support tool has been underexplored, while there are some blogs and white papers hint integration of Artificial Intelligence (AI) into sanctions and the benefits associated to it.

AI can help in contract analysis and assessing company operations by highlighting sanctions exposure in anticipation to regulatory changes (Taylor, 2022). According to Loy (2023) in his white paper terms AI can overcome the challenges in sanctions screening by AI

models which helps reduce false positives with high accuracy without compromising personal data privacy ensuring regulatory compliance.

Although the adoption of AI and ML in sanctions is slow compared to other areas but there are sufficient opportunities using advanced data analytics with data-driven approach to enhance sanctions screening compliance (Dessalet & Oloo, 2022).

The above-mentioned studies lack detailed analysis or discussion on use of BI in sanctions leaving a room for advanced study in this domain. This study explores those uncharted territories by identifying a noticeable gap and encourages a more detailed discussion on the combination of BI and AI to enhance decision-making in sanctions. This further reiterates the need for comprehensive research in the future related to utility of BI in sanctions.

3. RESEARCH APPROACH

3.1. Methodology

The concept of how sanctions being implemented within financial institutions remains unknown to the majority. This section describes how organizations monitor sanctions by establishing controls through sanction screening system and focuses on selecting a suitable methodology for this thesis. The goal of the thesis is to study the use case of BI as an aid to decision makers in sanctions related decision. Based on the scenario qualitative research method is selected. Qualitative research is to give a holistic view of the subject in study in a context-focused manner while quantitative is to study relationship between variables (Eriksson & Kovalainen, 2008).

Qualitative research in general includes three different approaches which are inductive, deductive, and abductive reasoning. Deductive reasoning deals with hypothesis or theory to confirm them against empirical data while inductive is focused on generating themes or patterns from observations (Eriksson & Kovalainen, 2008). Abductive approach is a combination of both deductive and inductive methodology. For this study, inductive reasoning is selected as a methodology as it is suitable to generate themes from the empirical data using a bottom-up approach.

3.2. Case Study

According to (Yin, 2009, p. 18) case study is “An empirical inquiry about a contemporary phenomenon (e.g., a “case”), set within its real-world context—especially when the boundaries between phenomenon and context are not clearly evident.”

Case studies have been one of the widely used methods for research studies. The use of cases studies has evolved extensively over the years as it provides a multidimensional view across different domains. It gives researchers the ability to uncover nuances and richness of real-world relationships by utilizing qualitative data (Järvensivu & Törnroos, 2010). In summary, case studies are the best way to understand complex phenomena based on context-rich data that can transform into meaningful insights. There are at least three different scenarios where case studies can be used, first is the one where the method is based on the addressing a research question, second scenario is where to study the process in a real-world context in its natural setting it can be done through interviews, questionnaires, surveys etcetera and third is

based on performing evaluations (Yin, 2009). Another important aspect of case studies is that multiple analysis can be done inside a single case unit analysis to achieve data triangulation.

To study the use case of BI it's important to understand ***how do sanctions screening work at an organizational level. And why it is important?***

Sanctions screening works by matching organizational data such as transactional data, companies, entities, and individuals against global sanctions lists. Global sanctions lists include lists from UN, OFAC, EU, United Kingdom (UK) and other international and local bodies. OFAC list comprises of all individuals, entities, groups, and companies designated under programs are called "Specially Designated Nationals" or "SDNs." Organizations have a sanction screening system in place that keeps on updating with sanctions update. Other than global sanctions list organizations also maintain internal control lists to keep track of the risk status. Screening systems match organizational data (transactions, customers, entities etc.) against external and internal sanctions list, once a match is found it generates an alert which are then investigated by a dedicated team to consider it a true match or false alarm (Probst & Mehta, n.d.).

Organizations mainly have transactional screening to screen those transactions involving sanctioned individuals, entities or organizations and customer/name screening to match individuals during onboarding like KYC and during the customer relationship (Gorny, 2022). Sanctions screening is important for an organization because this mitigates the risks of non-compliance. It is equally important to have an effective sanction screening system in place that is robust enough to adapt to changing needs. The general overview of sanctions screening can be seen in Figure 8 below.

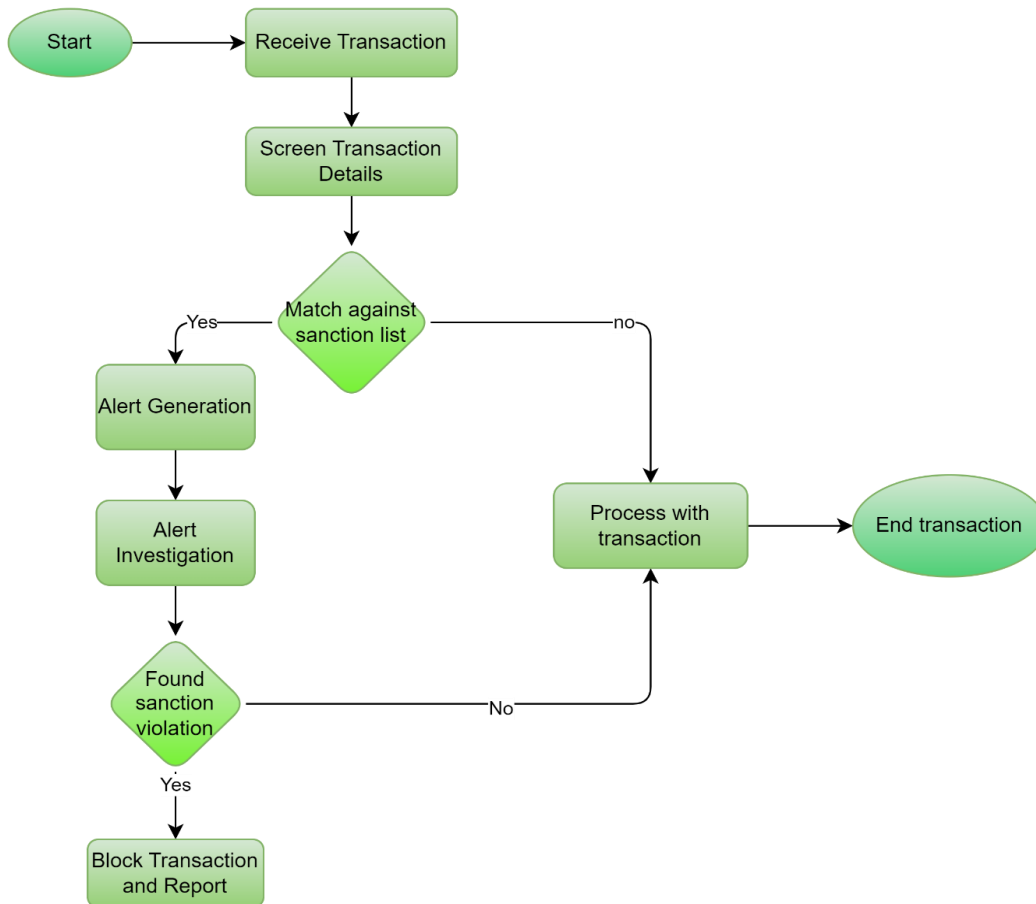


Figure 8. General sanctions screening process in organizations

The selection criteria for choosing an organization for this case study is that an organization must be a financial institution and have a functional sanctions department which covers prominent sanctions regime. They are using a data driven approach particularly utilizing BI for sanctions related decisions. The case organization was found suitable for this study as it fulfills the following criteria 1) A financial institution dealing with Sanctions, and 2) Utilizing data analytics and BI to help management take data driven decisions. The criteria further include a case study organization's adherence to sanctions compliance, having an operational screening system in place and covering the global sanctions regimes. The case organization is a financial institution dealing with banking services and asset and wealth management and has a functional sanctions screening system in place to track transactions with possible sanctions risks and ensure compliance. There is a dedicated sanctions department for all the sanctions related risks and compliance. Under this department there are multiple teams involved and have a data lake to store and track any changes in sanctions data to provide timely analysis. All the

transactions filter through a screening system in place which then generates alerts based on potential matches. The alerts are then investigated by level 1, level 2 and level 3 investigation teams based on the nature of alerts and alert outcome is decided by the following analysis.

Semi-structured interview was selected as it is a common method in qualitative research particularly in inductive reasoning approach. Semi-structured interviews are both structured and open at the same time enabling participants to talk about the topic widely in their own words which helps researchers to uncover topics during the interview process. In semi structured interviews both the researcher and participant developing knowledge on the topic in an interactive mode (Eriksson & Kovalainen, 2008). Semi-structured interviews play a vital role in exploring a theme or phenomena, drawing patterns, development of theory by using a flexible approach to data collective and analysis.

3.3. Research Data

The interviews were conducted in last quarter of 2023 and first quarter of 2024. The questions were designed to encourage open discussion about the application of BI in sanctions and how it's impacting the overall process. Interviewees were asked about the challenges related to screening process and how does BI play its role in uncovering those challenges. The discussion also explored the evolution of BI, its role in initiating collaboration and what future does BI hold in managing sanctions related risks.

The interviewees were selected from the case company based on their role in sanctions domain and the value that BI generates in supporting their sanctions decisions. Interviewees were based on 5 different locations where the organization operates. Table 1 shows the interviews that were conducted during data collection phase. Interviewees are presented as letters in alphabetical order for anonymity.

Table 1. Interviews conducted for the case study.

Interviewee	Country	Role in the Organization	Duration of the Interview
A	Denmark	Management Head Sanctions	28 minutes
B	Finland	Senior Data Analyst Sanctions	24 minutes
C	Sweden	Management Head Sanctions	34 minutes
D	Finland	Senior Expert Sanctions	26 minutes
E	Finland	Management Head Sanctions	15 minutes
F	Estonia	Senior Data Analyst Sanctions	20 minutes
G	Sweden	Senior Data Analyst Sanctions	22 minutes
H	Denmark	Senior Management Head Sanctions	21 minutes
I	Finland	Management Head Sanctions	21 minutes
J	Denmark	Master Expert Sanctions	28 minutes

Interviewees were invited for interviews by email. Due to different geographical locations, interviews were conducted remotely by using Microsoft Teams and were informed about the interview topic in advance. Interviewees were also asked for consent to record the interviews for data analysis, based on approvals interviews were recorded and transcribed. The language of the interviews was English as this was the business language of the case study organization. All the individuals interviewed were working with sanctions and have experienced BI in their role either directly or indirectly. There were total of 10 interviewees which were divided into 5 technical roles and 5 business sides to get unbiased perspective from both sides. The interview approach was influenced by the guidelines laid down by (Myers & Newman, 2007) for effective semi-structured interviews. Semi-structured interviews found suitable for this study as it gives flexibility to explore themes in depth during the interview and fosters open communication. Interviews were designed in such a way that it was taken in account that interviewees may experience lack of knowledge related to the topic, so it was important to have an open environment where there are “no right or wrong answers”. For data analysis, participants were asked about their background in the case study organization and how they have experienced BI in the current sanctions process in the organization. During the interview, participants were also asked about the challenges they faced in the current sanctions screening process. Data collection for this phase resulted in 81 pages of transcribed material ready for analysis based on 10 interviews which was considered suitable sample for this case study.

3.4. Data Analysis

This study focused on examining the value generated by BI in sanctions by getting to know the perspective of individuals working in sanctions domain. The guidelines and protocols presented by Lune and Berg (2004) are followed for the analysis of qualitative data. The process involves initially identifying broad categories from existing literature, followed by refining them based on data-driven insights. A coding scheme is then developed to organize and label the data accordingly. The data is sorted into these categories, patterns are identified, and findings are connected back to prior research. After all the interviews were conducted, all the textual data of 81 pages was then fed to ATLAS.ti (qualitative data analysis software) for effective and systematic coding of data into themes. ATLAS.ti proved to be useful in identifying themes and patterns in data using quotations connecting to categories.

Spiggle (1994) presented that for analyzing qualitative data researchers face two fundamental activities: analysis and interpretation of data. He proposed systematic analysis as a way for ensuring effective analysis that covers all the areas without any bias. In the first phase of analysis, transcriptions data was analyzed and cleaned for further analysis through ATLAS.ti where one by one transcriptions were read and generated initial coding through which quotations were linked to respective categories. There were a total 128 quotations that were categorized initially for this phase. Categories were then further grouped into themes by iterating through the quotations and finding similarities between the quotations. For the data analysis through visual representation Power BI was used to generate insights. The results of the first phase produced 8 categories which were further iterated in second phase by finding similarities grouping them together in two broader themes as shown in Figure 9.

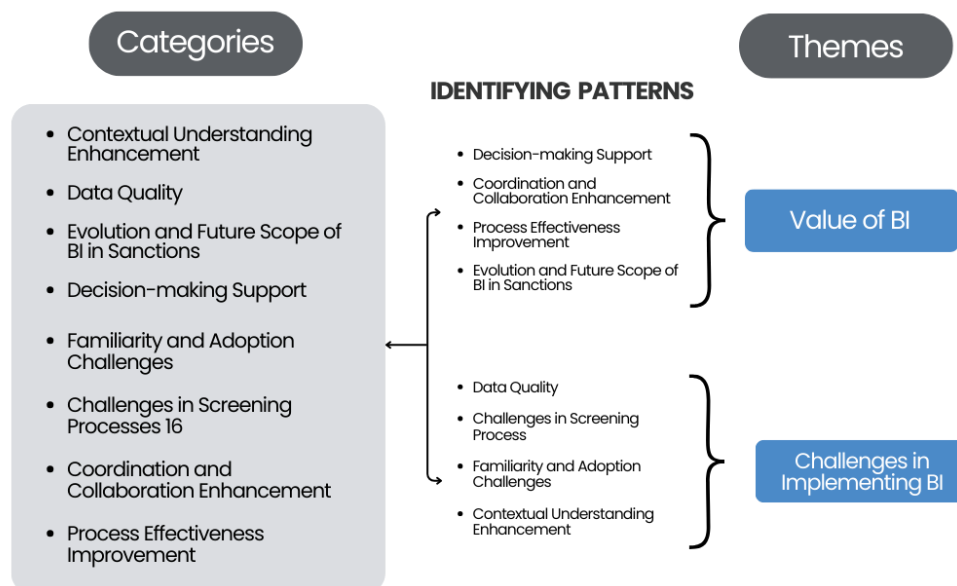


Figure 9. Example of analysis from identifying patterns in categories to grouping them into themes

4. RESULTS

This chapter discusses the empirical findings of the interviews conducted and analyzed in chapter 3. Overall, the interviews highlighted the importance of BI in sanctions in various aspects, recognizing its value in decision support, fostering collaboration and process improvement. It also reveals the challenges associated with its implementation and adoption because of common challenges in screening, data quality issues, familiarity with its application and to enhance contextual understanding.

Based on the analysis and interviewee's responses to the question which BI tool they are familiar with or used it in their work? Power BI emerged as the most popular choice, and it can be seen in Figure 10 below.

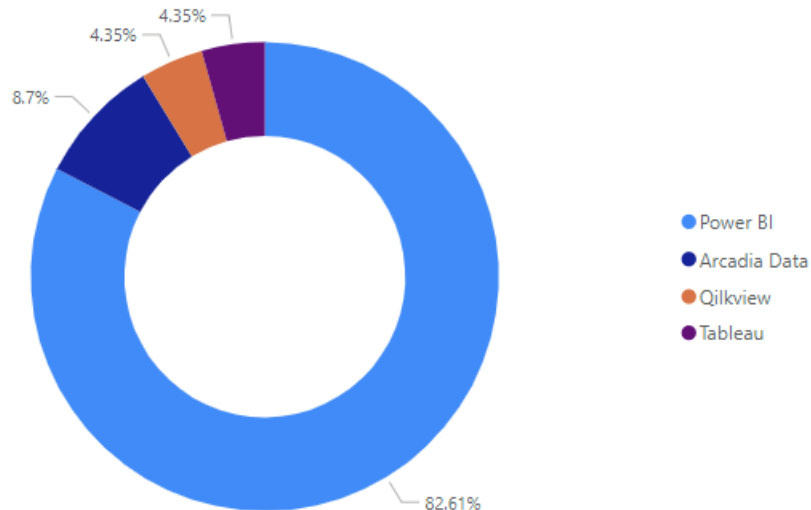


Figure 10. Most used BI tool by the Interviewees

4.1. Summary of the Findings

The following categories emerged as findings from the interviews grouped into respective themes in below Table 2.

Table 2. Coding scheme for this study

Themes	Categories
Value of BI	Decision-making Support
	Coordination and Collaboration Enhancement
	Process Effectiveness Improvement
	Evolution and Future Scope of BI in Sanctions
Challenges in Implementing BI	Data Quality
	Challenges in Screening Process
	Familiarity and Adoption Challenges
	Contextual Understanding Enhancement

4.1.1. Value of BI

The value of BI was identified as a major theme which was further divided into four categories. Table 3 shows the categories with their description and an example quotation from the interviews.

Table 3. Descriptions of categories of value of BI in sanctions with examples from the interviews

Value of BI	Description	Example(s) from the Interviews
Decision-making Support	BI is being used as decision support tool in sanctions by helping make informed decisions or aid in decision	<i>"I think utilizing BI is the only way to get more effective and let's say not maybe easier, but it gives us the common ground for decision making because everything that we ultimately do needs to</i>

Value of BI	Description	Example(s) from the Interviews
	making using data driven approach.	<i>be evidence based.” – (I, Management Head Sanctions)</i>
Coordination and Collaboration Enhancement	Enhances Coordination and Collaboration by leveraging BI to ensure sanctions compliance and facilitate in decision making.	<i>“BI starts raising questions that could not be so visible or obvious before, so it starts the conversation around the outliers about some suspicious things, about metrics and so on. So definitely it raises the discussion. Hence, it leads to the collaboration as long as we are aware of things, we can do something about it”- (F, Senior Data Analyst Sanctions)</i>
Process Effectiveness Improvement	Utilization of BI leads to improve process effectiveness to simplify sanctions compliance workflow, explore areas for improvement in data quality and better risk management.	<i>“For example, to improve data quality and things like that. So, I guess in that sense the effect like rolls down from the sanctions area to the business areas and then comes back as feedback ideally and basically improves the whole screening landscape in the organization.” - (G, Senior Data Analyst Sanctions)</i>
Evolution and Future Scope of BI in Sanctions	How BI is evolved at the organization level and its future possibilities in sanctions particularly advanced analytics with predictive capabilities?	<p><i>“I mean the thing is the more insights you provide using BI or similar tools even if it's just a report, the more people would ask for more. And so, it feels like it's blowing up more and more”- (G, Senior Data Analyst Sanctions)</i></p> <p><i>“I expect that the future is towards the more use of predictive analysis. And trying to predict how future sanctions</i></p>

Value of BI	Description	Example(s) from the Interviews
		<i>risk could emerge and is BI or associated modelling able to able to protect the organization from such a risk”- (J, Master Expert Sanctions)</i>

i. Decision Making Support

BI has played a significant role as decision support medium by automating manual processes and enhancing operational efficiency in sanctions compliance. It mitigates human errors particularly highlighting false positives and provides consistent data to make informed decision in a timely manner.

“I think if I can point out the monthly insights reporting for example, that is visible to all team leaders and the governance forums. I think that is a very good decision-making tool that helps me, for example, identify any trends or any peaks that as a team leader I need to follow up with the team to say let's investigate why. Why are we seeing this peak? And if there's some inconsistency or what we haven't seen previously. So, I would say that helps me a lot to support because I cannot follow all cases on an individual basis.” – (I, Management Head Sanctions)

Data from the interviews showed that with the help of BI tools decision makers can have real time insights that reduces operational risks and facilitates teams to make quick decisions.

“I think what is very useful is a combination of operational insights on one hand and risk related insights on the other. But in particular, where we're able to combine aspects of both and also do more granular insights and analysis that can then be turned into ongoing insights in the form of, for example dashboard”- (E, Management Head Sanctions)

BI empowers organizations by transforming data into clear and actionable insights, which help mitigate risks and ensure compliance with sanctions.

“When the war happened, we built a lot of dashboards which provided insight towards our management to identify first of all to understand how much the bank is exposed to that risk and then what are the mitigating actions that were taken during that period and the efficiency of those actions were available also in those dashboards”- (J, Master Expert Sanctions)

ii. Coordination and Collaboration Enhancement

Interviewees discussed the benefits of BI tools in improving processes, communication, and collaboration within the organization, particularly in the context of financial crime and sanctions. By leveraging dashboards and self-serving features, teams can streamline operations, enhance data quality, and make informed decisions based on analytics.

“I think by making the data more available, it's also making it easier to see the touch points and the connection points between the different teams and show how everyone fits together. On the other hand, by making all of this available self-service, it also removes one of the needs to talk to each other. So, when people can go directly in, just find what they need and leave it at that.”- (E, Management Head Sanctions)

The use of BI tools also promotes cross-team collaboration, enables fact-based discussions, and enhances visibility into organizational processes and workflows. By making data more accessible, BI tools enhance transparency, accountability, and collaboration, leading to robust and effective sanctions compliance strategies.

“What BI enable is a fact-based discussion on How are things and what can be done to improve the current shape of things? So, for instance, if our operations unit says we are burdened, what does it mean in practice? We can then the BI tools there will have the ability to bring up or visualize what does. What does normal look like for them?

I think the most important aspect is, is bringing people together around the same thing. That's where I feel BI contributes much more.” - (J, Master Expert Sanctions)

iii. Process Effectiveness Improvement

When it comes to process effectiveness and improvement in sanctions processes, BI has played a pivotal role in compliance and risk management. It enhances the overall effectiveness of sanctions screening process, aiding to automation and decision making. BI improves overall data quality as well by identifying issues at the early stage which then used as feedback to improve data quality.

“I think like the BI has significantly improved, like especially like the integration of data between systems so that we can all see it in one place and not having to check or do manual work with that.” - (D, Senior Expert Sanctions)

In terms of governance, BI provides tool for gap analysis and audit trail which supports accountability and data driven organizational culture. It provides reliability and accuracy in data-driven decision-making, transitioning from manual data collection to automated systems.

“It gives the accuracy more into the context because when we have the frameworks and we can rely on the data because the end of the day if we use the data for decision making, we need to understand that it's fully reliable and it is correct. So, I think the frameworks and the development and having this more automated coming directly from systems is better than someone filling in a form or something that collects the data. So yeah, I do see it” - (I, Management Head Sanctions)

iv. Evolution and Future Scope of BI in Sanctions

Based on the responses there's a consensus that BI has evolved significantly over the years in sanctions. Initially many units and management were unaware of the possibilities that BI could provide but now with the live dashboarding, monthly, quarterly, and yearly insights have opened new dimensions.

“I think the stakeholders and the business intelligence users are starting to evolve their thinking into what is actually possible and what would actually benefit them and not just

providing like raw numbers like this is how many alerts were handled. But, just like a more overall picture.”- (D, Senior Sanctions Expert)

The need for essential intelligence in the form of analytics has certainly underscores BI’s growing value in sanctions. The fast evolution of BI has transformed it into a key player in strategic decision-making, enhancing efficiency and data visualization.

“It is because of BI tools, we can identify, raise certain risk indicators, effectiveness indicators and so on that we don't enable the decision making upstream. I think it's just influences everything.”- (F, Senior Data Analyst Sanctions)

All the interviewees shared the same view that in future BI will play a very pivotal role in sanctions with progressing into AI predictive analytics to anticipate risks and operational demands. It will further automate the manual processes and dive into more advanced visualization to aid in decision making.

“I expect that the future is towards the more use of predictive analysis. And trying to predict how future sanctions risk could, could, could emerge and is BI or associated modelling able to able to protect the organization from such a risk?” - (J, Master Expert Sanctions)

“I’m not really looking into future, but I think on a larger scale some kind of more predictive algorithms would be beneficial also in that area, so that it would be easier and like more accurate predicting what kind of workloads might come or what kind of issues we might face.”- (D, Senior Expert Sanctions)

4.1.2. Challenges in Implementing BI

Implementing BI in Sanctions has its own challenges which was highlighted by the interviewees in association with general challenges in sanctions screening.

Table 4. Descriptions of categories of Challenges in Implementing BI in sanctions with examples from the interviews.

Challenges in Implementing BI	Description	Example(s) from the Interviews
Data Quality	Data quality issues such as inconsistent data, missing values and inaccuracy pose a challenge in implementation of BI	<p><i>“If that data isn't good and not in a structured way and correct, then we're not gonna be screening effectively either, and to be able to conduct BI as well, we need access to good data, structured data or data that can be structured to be able to conduct some sort of analysis. So, data is key in in pretty much everything.”</i></p> <p><i>– (C, Management Head Sanctions)</i></p>
Challenges in Screening Process	Challenges associated with sanctions screening processes including false positives, data quality issues, rapidly changing sanctions, regulatory requirements.	<p><i>“If a company or a person might have a very generic name, and then in the matching against transactions or customers it actually generates a lot of unwanted noise in screening..... we have a control to validate daily to see what is on the regulators website and is it equal to what our third party list provider gives us and if there's any differences, then we identify a data cap where we would need to plug the gap ”- (C, Management Head Sanctions)</i></p>

Challenges in Implementing BI	Description	Example(s) from the Interviews
Familiarity and Adoption Challenges	The degree to which people working in sanctions are familiar with BI and adoption related challenges such as lack of awareness of value of BI and need for technical expertise.	<i>“I guess there's different categories of what you would call BI, but I guess one of the main things that we use and that I'm familiar with is things like dashboarding.”- (G, Senior Data Analyst Sanctions)</i>
Contextual Understanding Enhancement	There should be a context with dashboards or insights generated through BI so that viewers don't get wrong interpretation of data.	<i>“We've tried to address this, although it's not pitched as such, but there are forums.....but that is something that needs to be consciously done. So, we don't just rely blindly on numbers without context.” - (E, Management Head Sanctions)</i>

i. Data Quality

Interviewees expressed their concerns related to data quality which is a hinderance in operations and implementing BI solutions as well. Data quality issues like inconsistent format, missing values and inaccurate data is a cause of concern in sanctions compliance. Data matching to lists is quite essential with periodic updates. There are issues with manual data entry and spelling errors which increases the risks of inaccuracy.

“There are data quality issues basically. So, like people writing same words differently with spaces in between or just spelling mistakes or stuff like that.” - (D, Senior Expert Sanctions)

“Needless to say, the data incompleteness and inaccuracy. The units or the business areas that collect the data do not have the understanding and perhaps nor should they, to ensure what data we need for proper sanctions screening to take placethe screening is as good as the data it looks at. And if the data is not good, it's not great screening.” - (H, Senior Management Head Sanctions).

It is also a blocker for integration of BI and to utilize its full potential. However, with the introduction of BI it raised more awareness about data quality issues among senior management. This has started a discussion how to improve data quality in general and initiatives to standardize the data with accuracy.

“There's definitely a drive for better data quality. I mean, we have some new data sources which are basically SharePoint lists and whatever from other teams that had absolutely terrible data quality. And because we are using them in for the BI tool, we basically forced them friendly to basically standardize it, enter the data carefully and so on which I guess improved that kind of data.” - (G, Senior Data Analyst Sanctions)

ii. Challenges in Screening Process

Sanctions being a complex domain with its ever-changing nature and regulatory updates it is important to have a functional screening system that meets the demand. The challenges uncovered during the interviews were mostly related to unstructured data, slow updating of information in Know Your Customer (KYC) leads to false positives and keeping up with regulatory updates. Screening efficiency also impacted by different data entry methods which contributes to data inconsistency. There are issues with alert investigation where sometimes personal judgement calls add risk to accuracy of data, and variety of data sources also contributes to the problems in the screening process.

“There is always the component of like the investigators, like own personal judgment and sometimes similar alerts that probably should have the exact same outcome, have a

different outcome just because there's the investigator in the middle and they make different judgments calls. So those are probably like the biggest issues I can think of” - (D, Senior Expert Sanctions)

One of the interviewees also highlighted that limited access to tooling, slow in adopting advanced technology, efficiency of processing methods and complexity of managing large data sets with an organizational structure are some of the obstacles. To have the full potential of BI in enhancing sanctions screening process it's imperative to address these challenges.

“We have other issues that I would call like we have limited accesses and also kind of insufficient tooling. I would call it on while not insufficient, it gets the job done, but it's definitely not the most efficient way of doing things.” - (G, Senior Data Analyst Sanctions)

“Generally, also within the process they're some issues happening when let's say the status flow and the workflow is being broken down by some issues and never being reported and said about until we discover it. And just generally the complexity of data that we are dealing with, it's a lot to process and to understand in the meantime.” - (F, Senior Data Analyst Sanctions)

iii. Familiarity and Adoption Challenges

One of the issues uncovered during the interviews was familiarity with BI in general in sanctions unit. Since our interviewee selection was based on both technical and business side to avoid bias which resulted in few of them aware about the BI tool but not the BI itself. Similarly, the use of BI was different from person to person and the role of the interviewee in the sanction's unit. Interviewees have expressed different level of familiarity with BI tools and the most used was Power BI. Some of them have used for analytical tasks, creating live dashboards and while the management was more focused on getting the holistic view from it to aid in strategic decision making.

“I would say not too much but behind the scenes of our intelligence units conducting analysis where we've identified high risk customers or suspicious activities from customers and where there's linking done to people in the same address or in the same area or people they're transacting with and using that kind of intelligence to link high risk parties or

connections between high-risk parties. But other than that, not too much” - (C, Management Head Sanctions)

The adoption of BI was also linked to the choice of tool being used and how effective it was given the organizational structure. The evolution of BI has contributed towards the selection of tool which serves the purpose and that can fit into complexities of sanctions data lake. Power Bi emerged as the most useful BI tool in the recent years. The adoption was slow and it’s still developing due to organizational constraints. Overcoming these challenges would be essential for the successful implementation of BI capabilities within sanctions frameworks.

“When I started in the team, it didn't really exist. There wasn't much clarity on the purpose or even the value addition of analytics per se ... And that's something we've worked on then over the past five or so years now to make it clearer exactly what value it is that analysts can bring as well as then try to sell essentially to our other stakeholders further away from the domain, why BI, why dashboarding? Why these kinds of insights are useful? So, we can make decisions based on facts instead of some opinions, and also make sure that we are especially in times where there's not so many resources necessarily that we can really focus where it matters.” - (E, Management Head Sanctions)

“I was exposed to Arcadia Data BI tool that showed itself not being very friendly, and then we switched to power BI. So right now, I'm putting together power BI, and I am responsible for creating the BI capability within sanctions unit.” - (F, Senior Data Analyst Sanctions)

iv. Contextual Understanding Enhancement

The primary challenge in the implementation is understanding the context of data to ensure users draw accurate conclusions from the numbers. There are several factors which could lead to wrong interpretation of information.

“The biggest concern that I would have for dashboard being created at the fingertips of users et cetera is if the wrong level person just double clicking on things producer report and walk away with the wrong Interpretation of the report itself, so numbers don't mean much without its context. Numbers don't mean much without its right commentary you see. So, if, let's say a unit head goes in and produces an email because he would like to see 2022

and 2023 flow of transactions by month, there's going to be seasonal factors in there. There's going to be system downtime, etcetera, etcetera. So, without that context, I think BI can actually be not utilizing in the best way” - (H, Senior Management Head Sanctions)

Based on categories and their respective themes here there is the visual representation in terms of percentage.

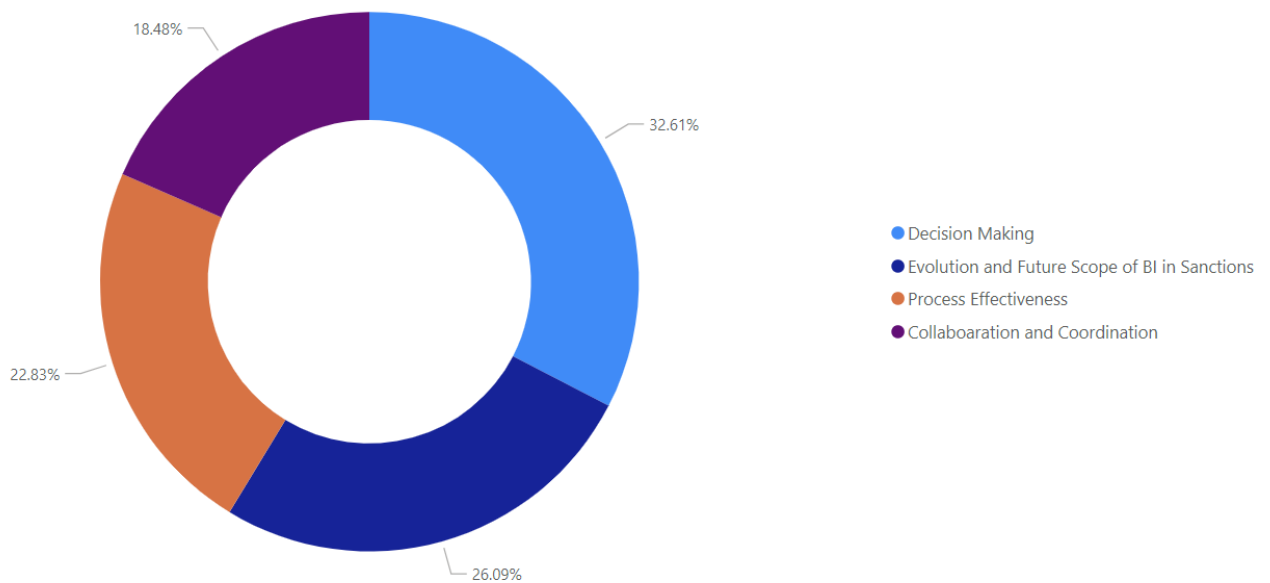


Figure 11. Category wise distribution of Value of BI in sanctions

From Figure 11 it can be deduced that all the four categories have fair share in terms of percentage while BI contributes more towards the decision making in sanctions and there is an agreement among the interviewees that in future BI will play a vital role in sanctions compliance.

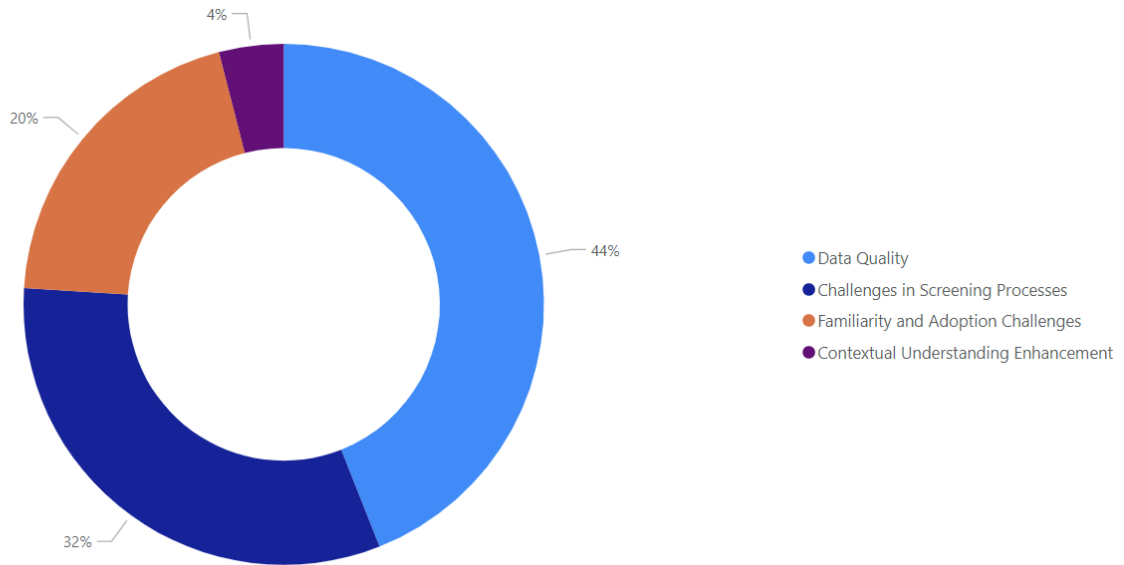


Figure 12. Category wise distribution of Challenges in Implementation of BI in sanctions

Similarly, if we analyze the category wise distribution of challenges in implementation of BI in sanctions in Figure 12 it is evident that the biggest challenge that was highlighted was the data quality issues and then followed by general challenges in sanctions screening process while familiarity and adoption was also noticeable.

5. DISCUSSION AND CONTRIBUTION

To conclude the findings from the interviews related to the case study, it is conclusive that BI has significantly improved sanctions compliance, its routine operations and effective decision making. BI played a great role in enhancing the screening process effectiveness, increasing collaboration, and anticipating future sanctions risks. It has also uncovered the challenges related to its implementation including data quality, lack of context, adoption, and screening process related issues. The data quality issues and other screening related challenges identified during the interviews link back to the literature (Gorny, 2022). Despite the direct empirical evidence limitation of use of BI in sanctions, the findings provide the synergy between BI and AI as future of BI in sanctions in the form of predictive analytics. This reflection was also found as a discussion in the existing literature by Dessalet and Oloo (2022) to use of advanced analytics to optimize sanctions workflows. Figure 13 is an overview based on the findings from interview showing how BI can be leveraged in Sanctions.

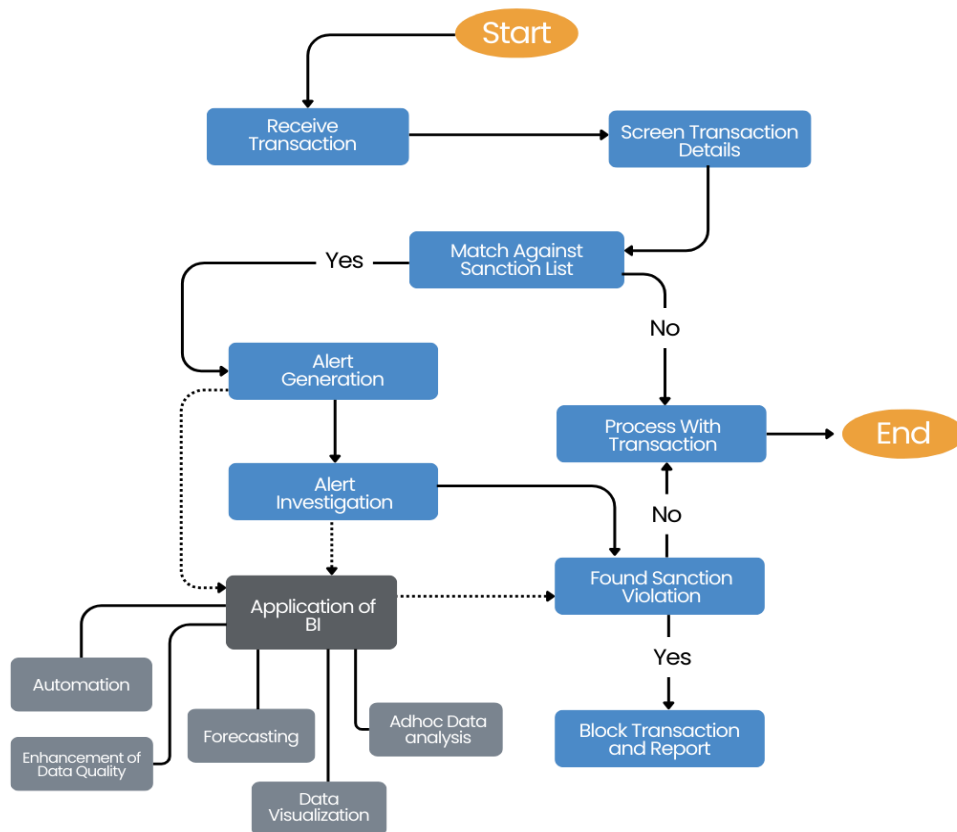


Figure 13. Leveraging BI in Sanctions

5.1. Research Contribution

This thesis contributes towards the under researched area of role of BI in sanctions compliance. Despite rich literature on the role BI in organizational decision making (Olszak & Ziemba, 2006) and the importance of sanctions in global compliance (Mechiev, 2019), the use case of BI in sanctions is not well studied. There are high level discussions around the use of AI in sanctions (Taylor, 2022), (Loy, 2023) and (Dessalet & Oloo, 2022) which looks promising but limited which implies the study gap. This thesis studied the role of BI for decision support in Sanctions on a deeper level thus bridging the gap by providing insights and empirical evidence. This study also recognizes the challenges in effective sanctions screening as explained by (Gorny, 2022). It acknowledges the literature on BI support in decision making and further extending that knowledge to study the application of BI in sanctions management.

5.2. Practical Contribution

This study has practical implications for organization working with sanctions to leverage BI in sanctions for decision making. This research based on findings have a various impacts including automation of processes, aid in decision making, initiates discussion and collaboration among teams, provide ad hoc analysis, data visualization for holistic view and enhances data quality by identifying the existing issues. This study elucidates the use of BI with AI and advanced analytics for prediction and forecasting. This thesis will encourage and guide organizations to adopt BI with progression to AI for sanctions compliance, effective screening and decision making.

5.3. Limitations

The results obtained from case study analysis contribute towards the research question, however addition investigation is recommended in this subject. The findings are based on qualitative data with limited number of interviewees, which may introduce bias and limit the generalizability to reflect on wider population data. It is recommended to avoid potential bias and more accurate results to increase the sample size and have a diverse representation of interview participants would be beneficial. Reliability of the study was assessed on the framework for evaluating qualitative research by (Lincoln & Guba, 1985). There were limitations around the actual sanctions data availability for utility of BI in sanctions due to confidentiality of data, hence the use of qualitative method was found suitable for this study.

The credibility of the study is based on qualitative study credibility checks proposed by Korstjens and Moser (2018). Credibility was assessed based on researcher's proper understanding of the research topic and to have diverse perspective interviewees were selected from both business and technical side. Semi structured interviews were conducted to have an open conversation and anonymity of interviewees was ensured which increased the credibility of the study.

Transferability of the thesis was mainly focused on the application of BI in sanctions compliance with respect to decision making but not limited to that. It includes experiences of interviewees and research methodology in Chapter 3. The details provide an overview that the findings can also be applied to other areas and can be adapted accordingly in their areas where BI can play a vital role as well. While the dependability of this research is to validate the reliability of the study by explaining how the research was conducted in Chapter 3 and Chapter 4 by aligning with the criteria established by Korstjens and Moser (2018).

As discussed by Korstjens and Moser (2018), the interview questions were designed to get more insights on how the use of BI is creating a value in sanctions compliance. The questions were structured in a way that sparks discussion and the follow up questions were asked at some instances so that interviewee understands the context of the questions and give further details on the specific subject to ensure the confirmability.

5.4. Future Research

In terms of future research, this thesis serves as foundation for more in depth study on application of BI in sanctions compliance. It opens more avenues for future research particularly to study the use of BI using quantitative studies to further make a case of efficacy of BI not only in sanctions but other compliance areas. This study can help explore the connection between BI and different sanctions regime with respect to regulatory requirements. This allows to study the challenges related to adoption of BI in compliance related areas. The future of BI in sanctions with integration of AI is going to be a next big thing that needs to be properly studied to understand how the combination is making an impact on decision making along with any process improvement particularly the use of predictive analytics in sanctions. Lastly, studies around the evolution of BI in sanctions to gauge long term effectiveness and building a data driven culture with effective use of BI would give a roadmap to organization in sanctions compliance landscape.

6. CONCLUSION

In conclusion, this thesis addresses the application of BI in sanctions for decision support, shedding light on other areas as well where BI is making a significant impact in terms of process effectiveness, enhancing collaboration and uncovering data quality issues. It has also highlighted a noticeable gap in literature when it comes to utility of BI in sanctions compliance. It signifies that BI will play an important role in the future of sanctions and its evolution into AI will provide a technological boost with exciting prospects for automation and predictive analytics. BI will provide more flexibility with evolving nature of sanctions and regulatory compliance. Overall, this research presents the need for more in depth discussion on use of BI in the evolving sanctions landscape and encourages the organization to conduct quantitative analysis on the effectiveness of BI in sanctions.

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