Addis Ababa University

COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCES
SCHOOL OF INFORMATION SCIENCE

Exploring factors affecting Ethiopian private banks data analytics tool implementation

By

Haimanot Gezahegn

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By: Haimanot Gezahegn GSE/0258/10

Advisor: Tibebe Beshah (PhD)

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Name and signature of Members of the Examining Board

Tibebe Beshah (Ph.D.)	_____	_____
Advisor	Signature	Date
Dereje Teferi (PhD)	_____	_____
Examiner	Signature	Date
Million Meshesha(PhD)	_____	_____
Examiner	Signature	Date

Declaration

This thesis has not previously been submitted for any degree and is not being concurrently submitted in candidature for any degree in any university.

I declare that this thesis entitled "**Exploring factors affecting Ethiopian private banks data analytics tool implementation**" is a result of my own investigation, except where otherwise stated. I have undertaken the study independently with the guidance and support of my research advisor. Other sources are acknowledged by citations giving explicit references. A list of references is appended.

Signature: _____

Haimanot Gezahegn Tsionmeskel

This thesis has been submitted for examination with my approval as a university advisor.

Advisor's Signature: _____

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Abstract

Data and Financial sectors are two much correlated concepts where by Financial sector by its nature has been an intensively data-driven industry. Data is characterized as the lifeblood of decision-making and the raw material for the sectors. Due to the high and variable demands of their end-users, these sectors are undergoing huge reforms and digitalization. As a result, these financial institutions are beginning to understand the importance of collating and utilizing their internal data such as debit and credit transactions, internet banking data and their digital channel application service using latest or moderate data analytics tools.

Generally, this analytics tools driven insights are used to the realization of competitive advantage and to achieve wider market share. Hence this study is aimed at identifying the Definition and characteristic, the role, current challenges, motivational and facilitator factor on the implementation of the data analytics tools in sampled Ethiopian private banks.

Thus, to meet the above objectives, qualitative methodology is adopted. Standardized open ended interview with 5 respondent whose work is directly related with these tools is conducted. For analyzing the data collected through interview a thematic analysis is conducted to identify patterns of themes. These themes are organized based on categories: i.e., facilitator factor, inhibitor factors and motivational factors of data analytics tool implementation. Under each category sub-themes are constructed namely: External factors, relative advantage, top level management, IT infrastructure, Human resource, Data management, Ease of use and customization. The result of the research is believed to provide an insight into the current status of the banks in implementing the tools. Additionally, the result can be used as a baseline for future studies related to the data analytics area for academic researches.

Key words: Data analytics, Analytics tools, technology acceptance models, Data analytics tools in banks

List of figures

List of tables

List of acronyms

ATM	Automatic Teller Machine
BDA	Big Data Analytics
BFS	Banking and Financial service
BI	Business Intelligence
BI&A	Business Intelligence and Analytics
CRM	Customer Relationship Management
DIO	Diffusion of Innovation
PEOU	Perceived Ease Of Use
PU	Perceived Usefulness
RDBMS	Relational Database Management System
RFID	Radio Frequency Identification
SARS	South African Revenue Services/
STOPE	Strategy, Technology, Organization, People, Environment
TA	Technology Acceptance
TAM	Technology Acceptance Model
TBP	Theory of Planned Behavior
TL	Theory of Leadership
TOE	Technology Organization Environment
TRA	Theory of Reasoned Action
UTAUT	Unified Theory of Acceptance and Use of Technology

Contents

CHAPTER ONE

Introduction

1.1 Background

The ever-changing environment in financial sectors is making the stakeholders of the industry to strive for competitiveness to keep up with the standard service delivery. The sectors are increasing their operational delivery by leveraging information technology to expand their service. These financial sectors are known to produce a large volume of real-time data through hundreds of thousands of individual transactions. The main sources of this information and data is being generated from ATMs, branch operation, agent banking, internet banking, mobile banking, and other channels [1]. The banks potential to analyze these different forms of voluminous data is paramount to the realization of competitive advantage and for the achievement of a wider market share.

As their main goal, the sectors provide financial service for their customers which in turn has enabled the end-user to manage their monetary lives. The sector also plays a key role in any country economy where banks are major providers of credit to individuals, businesses, and the government. As technology advances and competition increases, the banks are offering different types of services to stay current and attract customers. Due to the high and variable demands of their end-users, these sectors are undergoing huge reforms and digitalization. Currently, these financial institutions are beginning to understand the importance of collating and utilizing their internal data such as debit and credit transactions, internet banking data and their digital channel application usage to drive new insights for competitive advantage [1].

Coming to the financial sector, the ever more transactional data generating from ATM devices, agent banking services, branch operations, and other channels are generating a huge amount of digital data. Thus, these increasing flows of transactional data had opened an endless opportunity for the most forward-thinking businesses across several domains to capitalize on that data, and the banking industry is no exception [2].

Benefits of data analytics in the banking industry include[2] the following : It enhance the ability to address and monitor regulatory compliance, increase transparency and understanding of risk exposures to manage the business more effectively, It also helps to develop a risk-adjusted view

of performance, manage fraud effectively, measure customer and product profitability, Identify "high-potential" prospects and customers, The use of data analytics improves the ability to target products and services to prospects or customers, enhance specific elements of the offer—product, pricing, channel and allow senior management to make informed operational decisions.

The coming of the big data age provides firms with all the above opportunities, but to take advantage of this technology, organizational readiness, factors that facilitate as well as impede the implementation of these data analytics tools needs to be well explored. Researches has been conducted to explore factors and challenges that affect the implementation of these tools. These considerable challenges are lack of analytical and managerial talent, executive's attitude towards these innovation [3], right infrastructure, incentive and competition [4], Managers concern over cost [5], data quality, data content, data access and security, data consistency, and user training [6], security concerns, fear of losing control, and organizational resistance [7].

Like any technology, these factors may differ from one organization to another. These include; Management Support, Organization size, Finances, ICT infrastructure, Scalability, Security, Competition, Customers, and vendors [5]:

Therefore, the organizational factors related to this technology need to be assessed and explored. Previously conducted researches have indicated that data itself cannot produce business results; what's needed is a clear vision of how the business can gain results using the data. Also, the right technology and trained professionals are required to leverage resources and deliver results for data analytics projects [4].

Hence, this research is aimed at identifying the factors that influence the technology implementation of data analytics in financial institutions of Ethiopia. The research clarifies the theoretical perspective of data analytics and its application in the banking and financial sector exposing its various definition and characteristics. After contextualizing the concept of data analytics in financial institutions, its role, current challenge, and facilitator factor for the adoption will be explored by carrying out an empirical study among selected financial institutes. The main contribution of this research will then be revealed by gathering and uttering the elements that are prone to answer the research question.

1.2 Statement of the problem

Financial institutes are known to have a huge amount of data mainly generated from hundreds of thousands of individual transactions. Using this essential customer data, the sector has now unlocked the secrets of transaction movements. Even helped to prevent major disasters, thefts, Compliance issues and understand consumer behavior to help in marketing and customer segmentation [6]. Data analytics is enabling greater performance in organizations willing to make the proper commitment: across all industries, banks that are more analytically driven sectors that realize financial growth 4 times higher than their less analytical competitors [1]. These institutions will reap the most benefits of the available huge volume of data as they are able to extract good information quickly and early from their data and convert it into meaningful benefits for themselves and their customers [2]. Today's organizations have access to an innumerable amount of information. A study that shows the growth of data market between 2010 and 2015 has revealed a growth of $48 billion producing 2.5 gigabytes of data every day [8].

Nowadays financial institutions are recognizing the opportunities offered by data science technologies. Researches have been conducted to show the different application of data analytics for the financial institution. These studies have focused on banking analytics or application of data mining in the banking sector which assists in enhancing the performance of the banks by improving how banks segment, target, acquire, and retain customers. Through Data mining and advanced analytics techniques, banks are better equipped to manage market uncertainty, fraud detection, minimize fraud, and control exposure risk. For instance, similar data analytic application for the insurance company and risk analysis as one of the key areas of big data analytics application in the financial industry [6]. Much more researches, such as application of data analytics for risk management and investment banking [9], CRM applications for customer segmentation and marketing [10][11], data analytics in retail banking assist in screening new application for risk of default, to identify high-risk borrowers for auto loan [12].

Related researches have also been conducted to show the technical significance of analytics in the sector, these studies have been defined well in the literature review section of this research report. For the impact and behavioral aspect on the implementation of this technology, a recent study has confirmed that, in the past, new technological development first appeared in technical and academic publication, but while coming to data analytics the fast evolution of technology

and ready acceptance of the concept by public and private sector, left little time for disclosure to develop and mature in academic domain [13]. Therefore, studying the impact and behavioral aspect of this technology is a must before proceeding to the implementation of the tools to minimize early implementation failure and risks.

Approaching to the Ethiopian context, in the last couple of years, researches and studies in relation to data analytics have been conducted intensely but all had focused on the development of data mining applications for diverse areas and sectors.

For instance, Application of data mining technique to target potential visa card users for Dashin bank customers[8], data mining application for segmenting insurance customers of microfinance[10], application of data mining in effective customer relationship management in microfinance[11], An Integration of Prediction Model with Knowledge Base System for Motor Insurance Fraud Detection [14], Data mining application for extracting employees of Commercial bank of Ethiopia internet access pattern by URL category [15] are some of the conducted researches in a related area of data mining and analytics. Almost all the researches focus on the technical implementation of data analytics specifically aiming at developing data mining application for different sectors and study areas.

All the earlier studies conducted in Ethiopia focuses on the technical implementation of data mining applications in different sectors. Researches indicate that any organization should not start using these technologies unless they are equipped ready as it could lead to breaches of security, unethical decision-making process, wrong decision due to data with low quality, and faulty IT investment that can never be paid off are the main dangers [15][16]. Thus, there is a need for studying the adoption of this technology from an organizational perspective to explore more on the factors that affect its implementation. Almost all researches approve the benefit of using data analytics tools but didn't address other aspects that organizations need to address.

However, recent studies in this regard has confirmed that, a different application of data analytics tools might assist in improving the business process but the practice has shown questionable success from the application of data analytics, as a result, organizations do not achieve an appropriate degree of benefit from their data usage [17], [18], [19], [20], [21]. As researches have confirmed, before the adoption of any technology the organization needs to verify that they have the right people with relevant experience and skills as well if they are able to follow the

correct processes [22]. Recent academic research has shown that a question of 'Why people accept to use new technology?' must be answered to enhance the design, implementation, and evaluation process of new technologies [23]. Therefore, this research explores the potential challenges of the implementation of the tools in sampled banks of Ethiopia.

The only related research conducted in 2019 by Martha [24], which assesses the current status of financial institutions readiness towards big data analytics using STOPE framework following quantitative research methodology. The results reveal that most of the private banks have scored a low-level readiness towards big data analytics adoption. Based on the assessment result, the researcher recommends future works to be conducted to explore more on the barrier and facilitator factors of the area using different methodologies (qualitative or case study), different perspectives, points of view, variables, and frameworks [24].

Hence all the stakeholders of the data analytics in any sector needs to know the factor which influences the implementation and usage of such trending technology so that they will be able to take the issues into consideration during the planning, design and implementation phase. For studying factors affecting the implementation and usage of this technology, this thesis aims to empirically explore the factors affecting data analytics application from the perspective of the banking sector.

As highlighted above numerous researches had been conducted locally and abroad to illustrate possible application of data analytics, data mining and related concepts. Despite of having several studies on this area this research focuses on the possible challenges, roles and facilitator factor of implementing the data analytics tools. Recent studies this regard has confirmed that, A different application of data analytics tools might assist in improving the business process but the practice has shown questionable success from the application of data analytics, as a result, organizations do not achieve an appropriate degree of benefit from their data usage. The reasons for this failure are not clear and have not been well investigated [3]. Therefore, this research will focus on characteristics, roles, challenges, and facilitator factors for data analytics implementation in sample financial institutes of Ethiopia.

1.3 Research questions:

For a reason of studying factors that affects the implementation and usage of this technology, researcher has conducted an in-depth interview with concerned participants to answer the following questions.

- *What are the main inhibitor factors for data analytics implementation in sampled Ethiopian banks?*
- *What are the facilitator factors of data analytics implementation in sampled Ethiopian banks?*
- *What are the factors that motivate the banks to implement this technology?*
- *What is the purpose and usage of these tools in the sampled banks?*

1.4 Objective of the study

1.4.1 General objective

This research is designed to discover the main challenges and to explore facilitator factors for data analytics tool implementation in Ethiopian private Banks.

1.4.2 Specific Objective:

The specific objectives of this thesis are:

- To explore theoretical perspectives of data analytics exposing its various definitions, characteristics and its application in the banking and financial sector
- To conceptualize data analytics in terms of its use in financial institutions of Ethiopia.
- To explore the factors that motivate the banks to implement this technology
- To explore the kind of challenges that affect the implementation of the tools

1.5 Scope and limitation of study

The research focuses on exploring the facilitator and barrier factor of data analytics tools implementation in Ethiopian banking sectors. The study focuses on investigating the current

uncertainty and motivational factors towards data analytics implementation only in banks that currently implemented the technology. The scope of this research is therefore limited to barriers as well as studying facilitator factors for the adoption of data analytics implementation in Ethiopian financial institutes.

The limitations of the research could be that the input data for the analysis is restricted only in private banking sector therefore the results cannot be used as a reference for other financial sectors. The other limitation of the research is the data collection methodology lacks face to face interview. This is due to the current COVID-19 pandemic all the interviewees couldn't not agree on personal meetings and the researcher is forced to conduct the interview via telephone as a result interviews tend to be shorter. Generally, the phone call interview gave a chance for the researcher to ask question and inquire about the topic but without extensive time and cost as compared to face to face interview.

1.6 Significance of the study

Focusing on the financial institution where transactional data flow is very high, little academic research has been recorded specifically on financial sectors which focuses on the factors that affect the implementation of these analytics tools. Hence this study is believed to contribute to the area body of knowledge.

Often adoption of emerging or trending technologies in any sector is believed to bring new change to the existing working practice and processes thus it is considered as disruptive by members of the organization [69]. For these reasons understanding the factors that can influence the utilization of the technology can assist the financial sectors to implement strategies and improve the update of the innovation adoption process. Hence the result of these research will give an insight about the factors that influence of implementing and usage of such tolls so that they will take this issue into consideration during the planning, design and implementation phase.

Another important significance of the study is that the result can be used as a baseline for future studies related to the data analytics area for financial sectors so that the study can provide an input for other researchers to further study on the field. Even more, the result of the research will

provide an insight into the current status of the banks which in turn helps in guiding a decision-making process towards the adoption of these tools. even more, the results can reveal the current challenges of the sectors in their readiness level.

1.7 Organization of the thesis

This research consists of five chapters. The first chapter deals with a general background, statement of the problem, justification of the study, objectives of the study, scope, and limitation of the study, and research question. The second chapter deals with giving a general overview of related literature on the area of big data analytics, big data analytics in financial institutions, and readiness factors for its adoption. The third chapter describes the under linking methodology, samples, data source, techniques, and practices to ensure data validity and reliability is explained well for conducting the research. Chapter four, the most relevant chapter, discuss the result and finding of the research toward identifying the factors for low readiness level of financial institution towards big data analytics adoption. The final chapter, chapter five, deals with giving of conclusion and recommendation based on the investigation of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

As one method for getting in-depth insight into the area, an exhaustive systematic literature is done. This section, literature review aims to identify the concept of big data in organizations based on the papers that have been done locally and abroad. The review is based on a detailed reading of a selected body of reference material related to data analytics and technology acceptance factors and measurement in an organization but more focus is given to financial institutions. The literature review is designed to meet both time and comprehension parameters. A preliminary reading of abstracts and summaries is conducted to determine the level of appropriateness of selection and evaluation criteria. This method will consist of a search for source materials, the selection of the source materials, and their analysis and synthesis. Therefore, this literature analysis is believed to enable the researcher to find the appropriate conceptual framework that can be adapted or tailored to Ethiopian context and assist the research in assessing the readiness factors of big data analytics in a selected financial institution.

The main goal of this research is to identify the main factors that affect the implementation of data analytics in Ethiopian banks. The factors include both the positive influence and the negative factors that affect the implementation of the tools. Extensive research is available on behavioral intentions and the use of technology in IS. However, this study focused on the disruptive phenomena of data analytics, its applications in the banking sector, and reviewing possible frameworks for technology adoption. To focus on those areas only an effective way of extracting factors from an academic journal is required. To build a good foundation for these works, content analysis is done to review the appropriate available frameworks and address the research question. The content analysis phase of the research follows the following phases.

- First, a set of criteria to include or exclude a paper is framed and specific search terms are defined.
- Second, based on the developed search terms research papers are collected which will address the research question of any potential factor that might affect the organizational adoption of big data.
- Third, we examined the results obtained and explained the findings, inferring the results, and demonstrating the validity.

Therefore, in this section latest literature regarding big data analytics adoption is described in detail. The discussion has subsections: First, the concept of big data is explained, then the latest applications of big data analytics in financial institutes, financial institute's readiness toward big data analytics technology, and lastly related literature are explored efficiently. Thus, this section explores a wide variety of literature and applications and reveals the applicability of data analytics tools in financial institutes and adoption frameworks across multiple cultures, geographies, and different contexts [9], [26], [27], [19], [20], [28], [29], [30].

2.2 Big data definition and characteristics

Nowadays, in the information industrial revolution era, organizations and governments focus on the development of capabilities that provide knowledge extracted from large and complex data sets, commonly known as "big data". In the last decade big data is a buzzword repeatedly discussed in relation with data, specifically in business and economics fields, since it plays an essential role in economic activity and has strengthened its role in creating economic value by enabling new ways to spur innovation and productivity growth [13]. Given its current popularity, the definition of big data is rather diverse, and reaching a consensus is difficult. The lack of a formal definition has led research to evolve into multiple and inconsistent paths. Furthermore, the existing ambiguity among researchers and practitioners undermines the efficient development of the subject [31]. Therefore, since there is no unified definition it is useful to consider some of the most commonly accepted views, which at heart consist of anything to do with large data set. Usually, Big Data is a concept often used when an organization's existing traditional relational database and file systems processing capacities are exceeded in high transactional volumes, velocity responsiveness, and the quantity and/or variety of data [1], [2], [4]. The data are too big, move too fast, or don't fit the structures of RDBMS (relational database management system)

architectures making scaling a problem. As noted in [32], Big Data is not a single technology, but a combination of new and old technologies that support companies gain insight while effectively handling data load and storage problems.

Generally, the term 'Big Data' is used to describe a wide range of concepts: from the technological ability to store, aggregate, and process data, to the cultural shift that is pervasively invading business and society, both drowning in information overload [31]. Big data means not only a large volume of data but also other features that differentiate it from the concepts of ''massive data'' and ''very large data'' [15]. In 2011, big data refers to the collection of large and complex datasets that are difficult to process using traditional database management tools or data processing applications [16]. Some sectors Exhibit far higher levels of data intensity than others, implying that they have more near-term potential to capture value from big data. Financial services sectors, including securities and investment services and banking, have the most digital data stored per firm on average. This probably reflects the fact that firms involved in these sectors tend to be transaction-intensive. [17]

First, to have a clear concept about the term big data, a conducted study has presented a consolidated description of big data by integrating different definitions from practitioners and academics. Big data is described in terms of 3Vs (Volume, Velocity, Varity), later 4 Vs' (Veracity dimension added), 5Vs (Value dimension added), 6Vs (Veracity dimension added), 7Vs (Variability dimension added), 8Vs (Volatility dimension added), 9Vs (viability dimension added) and now to 10Vs' (Viscosity dimension added). In 2014 data science central has defined big data in 10V's, i.e. Volume, Variety, Velocity, Veracity, Validity, Value, Variability, Volatility, Viability, and Viscosity [33], [34], [35].

Volume: Data volume measures the amount of data available to an organization, which does not necessarily have to own all of it as long as it can access it. It refers to the large data set generated by science and education, business, and human interaction records. Data volume plays a significant role in storage and processing.

Variety: Data variety is a measure of the richness of the data representation – text, images video, audio, etc. From an analytic perspective, it is probably the biggest obstacle to effectively using large volumes of data. It generally defines verity as structural heterogeneity in a dataset.

Velocity: Velocity refers to the rate at which data are generated and the speed at which it should be analyzed and acted upon. Data velocity measures the speed of data creation, streaming, and aggregation. Ecommerce has rapidly increased the speed and richness of data used for different business transactions (for example, web-site clicks).

Veracity: Data veracity refers to the biases, noise, and abnormality in data. Is the data that is being stored and mined meaningful to the problem being analyzed. Veracity in data analysis is the biggest challenge when compares to things like volume and velocity.

Validity: When the status of data changes from exploratory to actionable, data should be valid. This property of Big Data is essential to find the presence of hidden relationships among elements within huge Big Data generation sources.

Value: Data value refers to data usefulness in decision making and is one of the most significant factors in Big Data because it has a direct impact on business profits.

Variability: SAS introduced Variability as the variation in the data flow rates. Often, big data velocity is not consistent and has periodic peaks and troughs.

Volatility: Big Data Volatility refers to the life duration that for how long-time data is valid and for how long time it should be stored.

Viability: The meaning of Viability is that the Big Data should have the capability to be live and active forever, and able for developing, and to produce more data when need.

Viscosity: Complex Data management can be very complex for huge data sets especially when they come from different sources because linking, matching, and transformation are significant activities. The complexity of Big Data deals with the degree of correlation and interdependencies in big data structures.

Recent study has reviewed available diverse and significant occurrence of this term both in academic and business literature and identify four key themes to which big data refers [31]:

- **Information**: One of the fundamental reasons for the Big Data phenomenon to exist is the current extent to which information can be generated and made available.
- **Technology**: The term Big Data is frequently associated with the specific technology that enables its utilization. The extent of the dataset size and the complexity of operations needed for its processing entail stringent memory storage and computational performance requirements.

- **Methods**: The analysis of extensive quantities of data and the need to grasp value out of individual behaviors require processing methods that go beyond the traditional statistical techniques. The knowledge of such methods, of their potential and, above all, of their limitations requires specific skills that are hard to find in today's job marketplace. Investing in Business intelligence would be interdisciplinary and cover critical analytical and IT skills, business and domain knowledge, and communication skills required in a complex data-centric business environment. The investment in analytical knowledge should be accompanied by a cultural change that would span across all employees and urge them to efficiently manage data properly and incorporate them into decision-making processes
- **Impact**: The extent to which Big Data is impacting our society and our companies is often depicted through the success stories of the technology implementation. These stories represent a valuable contribution to the creation of knowledge on the subject. The pervasive nature of the current information production and availability leads to many applications spanning in numerous scientific fields and industry sectors that can be very distant from each other.

Big data systems can be decomposed into four sequential modules; namely, data generation, data acquisition, data storage, and data analytics [15]. Data Generation concerns how data are being generated, this is to mean large diverse and complex dataset that generated from different data sources. However, there are overwhelming technical challenges in collecting, processing and analyzing these datasets. Data acquisition refers to the process of obtaining information and is subdivided into data collection, data transmission, and data pre-processing. Data storage concerns persistently storing and managing large-scale datasets. Data analysis leverages analytical methods or tools to inspect, transform, and model data to extract value [15].

2.2.1 Uses of big data

The use of big data is now becoming a key way for companies to outperform their peers Financial and insurance sectors are one of the main sectors to reap the benefit of data analytics. Recent research has identified five broadly applicable ways to leverage big data that offer transformational potential to create value and have implications for how organizations will have to be designed, organized, and managed [17].

Creating transparency: Making relevant data more readily accessible across otherwise separated departments can sharply reduce search and processing time.

Enabling experimentation to discover needs, expose variability, and improve performance: As they create and store more transactional data in digital form, organizations can collect more accurate and detailed performance data Using data to analyze variability in performance —and to understand its root causes can enable leaders to manage performance to higher levels.

Segmenting populations to customize actions: Big data allows organizations to create highly specific segmentations and to tailor products and services precisely to meet those needs. Even consumer goods and service companies that have used segmentation for many years are beginning to deploy ever more sophisticated big data techniques such as the real-time micro-segmentation of customers to target promotions and advertising.

Replacing/supporting human decision making with automated algorithms: Sophisticated analytics can substantially improve decision making, minimize risks, and unearth valuable insights that would otherwise remain hidden. Decision making may never be the same; some organizations are already making better decisions by analyzing entire datasets from customers, employees, or even sensors embedded in products.

Innovating new business models, products, and services: Big data enables companies to create new products and services, enhance existing ones, and invent entirely new business models. Manufacturers are using data obtained from the use of actual products to improve the development of the next generation of products and to create innovative after-sales service offerings.

2.2.2 Data analytics basic concept and definition

Data analytics has been defined in several different ways but is derived from business intelligence and analytics (BI&A). From an organizational point of view, data analytics is the method for looking at big data to reveal hidden patterns, incomprehensible relationships, and other important information that can be utilized to resolve on enhanced business decisions [20]. Other scholar's define data analytics as an approach or type of business analytics that assists organizations to analyze large amounts of data in a timely fashion [3]

Data is worthless in a vacuum. Its potential value is unlocked only when leveraged to drive decision making. To enable such evidence-based decision making, organizations need efficient processes to turn high volumes of fast-moving and diverse data into meaningful insights [4].

Data management involves processes and supporting technologies to acquire and store data and to prepare and retrieve it for analysis. Analytics, on the other hand, refers to techniques used to analyze and acquire intelligence from big data.

Data analytics is the systematic approach of collecting, processing, and analyzing data sets using statistical and other business analysis methodologies regardless of size and volume to provide better insights in strategic, tactical, and operational decision making. Hence, it can also be exemplified as the systematic approach of the collection of massive data sets, processing, and analyzing for data-driven decision making [9]

Oddly enough, big data was a serious problem just a few years ago. When data volumes started skyrocketing in the early 2000s, storage and CPU technologies were overwhelmed by the numerous terabytes of big data—to the point that IT faced a data scalability crisis [36]. Enterprises went from being unable to afford or manage big data to lavishing budgets on its collection and analysis [19]. Data analytics is quickly becoming a critically important driver for business success. Many organizations are increasing their Information Technology budgets on Data Analytics capabilities. A forecast for data and business analytics shows that the solution might reach up to $189.1 billion In comparison with 2018 the number shows 12 % growth, and to have 13.2% increment by 2022 with a revenue of $274.3 billion [8]

While analyzing the worldwide use of these data analytics tools, according to a 2010 data warehouse institute survey, 38% of organizations surveyed reported practicing advanced analytics, whereas 85% said they would be practicing it within three years [29] . The rush to analytics means that many organizations are embracing advanced analytics for the first time, and hence are confused about how to go about it. [4]. In fact, in a recent study, it is revealed that data analytics tools are not just only for “big” organizations; regardless of size, organizations can apply the same principles to extract untapped value from data sources both within and outside their organizations [25]. As one of data analytics applications for banks, stream processing is one of the technologies designed to process large real-time streams of event data. Stream

processing enables applications such as algorithmic trading in financial services, RFID event processing applications, fraud detection, process monitoring, and location-based services in telecommunications. Which is also known as event stream processing [3].

As discussed above the interest in implementing these techniques is now having enormous interest from the company, though in the meantime, implementing these techniques has its setoff policy issues that will become increasingly important, these issues include, but not limited to, privacy, security, intellectual property, and liability. Personal financial records are used as pinpointed to appropriate financial products to a customer however customers also view those categories of data as most sensitive ones [31].

2.2.3 Data analytics application in the financial institutes

Gone are days when customers had to stand in line daily to do their transaction but now thanks to technology revolution customers can use their mobile phones and other devices to transact whenever they needed. As a result, increasing the method of channel for banking transactions results in the generation of vast amounts of data that traditional data management tools cannot handle.

To gain an advantage of these transactional data, data analytics is implemented in financial institutes as one of the trending technologies, because many types of research have confirmed that the tools are the main driver of innovation in the banking industry. Generally, this section discusses about latest researches which are based on the application of data analytics tools used in financial institutes.

The future of the world business economy depends on ICT and its capabilities. This statement is explained clearly by research, clarifying that, from an industry point of view, big data and data analytics is going to play an important role in the fourth industrial revolution. The first industrial revolution (from the end of 18th to the start of 20th centuries) depended on water and steam power, the second (from the start of 20th century to early seventies) depended on mass production, based on the division of labor and electrical energy, and the third (from early seventies to the present day) depended on electronics and IT for further automation of production [9]. It is expected that computer and electronic products and information sectors, government

sectors as well as finance and insurance and government will gain substantially from the use of their big data [3] enhancing the productivity and competitiveness of companies and the public sector and creating substantial economic surplus for consumers. New techniques and technologies used with big data allow Companies to gain useful information at a much lower cost due to their scalability and flexibility in analysis. It allows banks a simplified and cost-effective way to source their data and convert it into usable information [65]. Data analytics technology can help generate important cost advantages due to a higher level of scalability and large volumes of data managed at a lower cost per unit. By using automated and sophisticated analytical tools can store and analyze data faster and more easily.

Recent survey research indicates that 71% of firms in the financial services industry at a global level are exploring big data and predictive analytics and that 70 percent report that data analytics is critically important to their firms [37]. Data analytics is now being implemented across various spheres of banking sector and is helping them deliver better services to their customers, both internal and external, along with which is also helping them improve on their active and passive security systems [6]. Banks internationally are beginning to harness the power of data to derive utility across various spheres of their functioning, ranging from sentiment analysis, product cross-selling, regulatory compliance management, reputational risk management, financial crime management, and much more. Coming to Ethiopian context Banks are known to be the major producer of real-time data and as a result, they are one of the few sectors with a chance to reap the most benefits from these data as they can extract good information quickly and easily from their data and convert it into meaningful benefits for themselves and their customers.

Having the highest volume of real-time transactional data specifically in banking sector data science is becoming a mandatory requirement in creating better service for the customer and devising strategies for various banking operations [5]. Furthermore, banks need data to grow their business and draw more customers as a key enabler of business operation. Analytics should be a part of every major initiative in areas ranging from customers to risk, from finance to workforce and supply chain.

To provide new service to customers the banks need to segment the customers properly, and customer segmentation for financial services companies usually assist the banks in identifying

the customer fit categories, for instance, it can be used for answering the following loan questions “Is the customer looking for a car or housing loan?” or “Do the customer needs channel service to perform a transaction or not?”. Therefore, banks can use customer Segmentation feature to deliver effective real-time offers, and to optimize customer portfolios needs to be to a level that could compete with what online advertisers do with web context worldwide e-business market place [8].

Since these financial sectors have updated data of their customer, using different data analytics tools they will be able to interact with their customer differently by recommending new product types, services or optimized portfolios to the existing customer using different channels at the right time to new and existing customers. A lot of the financial institutions/banks are currently shifting their marketing focus from traditional marketing focus that are outbound in nature to more point -of-impact real-time fact-driven channel-based marketing concepts. Worldwide analysis shows that the banking and financial services (BFS) industry has been one of the biggest adopters of data analytics technologies such as Hadoop. However, a lot of potential is unrealized when it comes to leveraging the data on Hadoop for analysis and decision-making. One major issue that plagued the industry was mainframe data integration, which required lots of resources with uncertain risks and rewards involved [24].

Having reviewed over 100 recent DM applications in banking post 2013, the researcher concluded that the banking industry adopts big data analytics mainly for the following purpose [6]:

- **Security and fraud detection**: Big secondary data like transaction records are monitored and analyzed to enhance banking security and distinguish the unusual behavior and patterns indicating fraud, phishing, or money laundering.
- **Risk management and investment banking**: Analysis of credit card transactions of their customers these analytics tools enable the banks in granting credit scoring and allowance for risk management and investment evaluation.
- **CRM**: Customer relationship management tools have been widely implemented in financial institutes for handling marketing, related purposes of the customer relationship as customer profiling, customer segmentation, and cross/up-selling. These tools assist the sector to have a better understanding of their customer, to target potential customers

while campaigning, to predict customer behavior for acceptance of the new product, and further improve customer satisfaction with a strategic service design. About half of the implementations are targeting customized marketing and cross/up-selling, followed by customer retention and acquisition covering about 1/3 of CRM implementations.

- Other advanced supports: These advanced supports of the analytics tools for the financial sector includes branching strategy, efficiency and performance evaluation of their employee which can significantly assist in achieving the strategic branch allocation and expansion plans.

Additionally, the study addressed the significance of fraud detection and risk management as they account for 28% and 26% of the overall applications [6].

Weka, Matlab, and SPSS are the most popular software adopted, followed by R and Rapid Miner. The most frequently adopted DM techniques are classification 60% and clustering 28%. However, it is noted that most of the applications are employing more than one DM technique, also generally the papers adopting classification techniques use more than one specific classification technique for comparison purposes. Specifically, K-mean clustering is the most frequently applied clustering technique and the top three classification techniques are NN, DT, and SVM. ARM seems rarely exploited considering its 5% proportion, and it is hardly seen integrating text mining or social network analysis mining [11]. These tools are assisting the companies to reap all the benefits of data analytics with excellence.

In our country, several studies had been done on data analytics over the last years and most of the conducted studies are focused on the technical implementation of data analytics specifically data mining application. These extant literatures propose different applications of big data analytics specifically focusing on data mining techniques as a tool of end-user segmentation and prediction. As explained briefly in the previous section, data analytics is the process of creating various analysis models and simulation to present a particular scenario that assists with future prediction and overall decision making one of the most popular areas in data analytics is data mining, used for discovery of meaningful correlations, patterns, and trends among large datasets based on pattern recognition, statistical and mathematical techniques [5].

Data Mining (DM) techniques are key for the banking sector, which aims to reveal valuable information from the overwhelming volume of data and achieve better strategic management and customer satisfaction. As such, revealing the hidden information in big data via Data Mining (DM) techniques has become an emerging trend and the ultimate objective for a wide range of studies [6]. Moreover, the development and popularization of e-banking and mobile banking adds to the exponential growth of real-time banking information. These continuous developments and the rapidly increasing availability of big data make mastering relevant big data analytics tools one of the most crucial tasks for the banking sector.

Fraud risk poses a very big challenge for the insurance sector. Nowadays, efforts have been made to develop models to identify potentially fraudulent claims for special investigations using data mining and knowledge base system. [14] In year 2016 has integrate data mining with knowledge-based system for fraud detection. The researcher applied first the clustering algorithm followed K-mean clustering algorithm to develop a predictive model with the aim of classifying the different insurance claim as fraud and non-fraud Using PART classifier Knowledge base on Awash insurance dataset. As an end result the researcher designed a system that identify claim using constructed KB acquired from data mining models.

Another research used data mining process models suggested by Sharma which consist of data collection, data preprocessing, pattern discovery and pattern analysis to extract Commercial bank of Ethiopia employee internet access using web mining and analytical tool to assist in an indication of efficient bandwidth utilization for the bank [15].

Similar research has applied data mining techniques in Ethiopian Insurance Corporation to build models that segment customers based on their attributes. The researcher has used crisp Methodology K- means clustering algorithm and J48 decision tree algorithm of WEKA implementation to discover useful patterns and to analyses data. In general, the researcher has pointed out that customer segmentation using classification and clustering data mining techniques is necessary for the LAD and marketing department of the insurance company [28].

Data mining techniques are also being applied to support loan risk assessment, research on the united bank using two data mining techniques namely, Decision tree and neural network in support of loan risk assessment. Different decision tree models using the j48 algorithm were

constructed during the experiments and among them, a tree with an overall accuracy of 95.65% with conceivable rule was selected. As the result, the researcher was able to find out new attributes: Networking capital, Current Ratio, Total Asset, TL/TA, Current Liability, Collateral Value, Years in; Business, Number of prior term loans settled, Performance of term Prior Loans, Collateral Type, Credit Relationship with other banks, Trade Sector, Performance in; other types of the loan; and Current Asset[29].

A similar kind of classifier model was also being applied to customers of Buusaa Gonofa and wisdom microfinance institutions [10] [11] the same as most researches, K-means, and J48 classifier algorithm were applied to the dataset in segmenting customer record into a cluster with similar characters. Both types of research report the study of the application of data mining that helps build a classification model that supports the prediction of a new borrower's status as highly privileged, moderately privileged, or less privileged during the loan decision making of the institutions.

Related with the above segmentation data mining technique in another research, a model was built that helps in classifying the book customers of Dashen Bank, To their expected response to direct campaign and to identify the potential visa card customer who should be contacted in direct marketing campaign using their available data and other important variables. K-Means was used as a clustering algorithm to segment customers' records into clusters with similar characters. Different parameters were used to run the clustering algorithm before reaching at segments that made business sense. J48 decision tree algorithm was used for classification purposes. The investigation was conducted based on the CRISP-DM process model [8].

Moving to other local sectors where data mining applications are applied to extract other meaningful patterns, Research had used Data mining techniques to extract meaningful crime trends regarding offenses against children from the data in existing police records with the help of data mining techniques. The researcher has used the six-phased CRISP-DM for data mining process the output helps in identifying and predicting potential victims of a crime category through predictive models and attributes the profile of victims with the help of descriptive technique [12].

Data mining applications are also being applied well in the health sector; research applied data mining algorithm to patient data which helps in establishing a meaningful pattern for effective TB diagnosis. The research specifically focuses on the use of a clustering algorithm followed by classification for data mining. Experiments were conducted by applying K means clustering algorithm and J48 decision tree and naïve Bayes classification algorithm to assist in segmenting datasets into TB-positive and TB-negative [7].

Additionally, data mining technique application on ART data collected in the case of Adama and Asella hospital to identify important patterns related to determinant attributes and their values for Termination/ Continuity behavior of patient on ART care service [9]. Various data preprocessing activities were made to come up with the dataset ready for model building. The researcher selected two DM functionalities (Classification and Association rules mining). Decision tree classification with J48 implementation with eight scenarios was experimented. Thirteen experiments with different parameters were made for association rule mining. Evaluation of the models was performed by using for each DM functionality and scenarios used to model the dataset.

2.3 Technology Acceptance Models and theories

As discussed in previous sections real-time data are now being generated in a high volume of speed. To gain value from these data, organizations need to adopt better ways of processing it such as using data analytics tools. The ability of these tools ranges from collecting, managing and analyzing potentially massive volumes of different data, at the right speed, with the right time frame to providing the right-time analysis and activity to end consumers [45]. Recognition of the needs and acceptance of individuals is the beginning stage of any business and this understanding would be helpful to find the way of future development [38]. Also, organizational factors affecting the implementation of any change must be well exploited to gain all possible advantage of it. Therefore, it is significant to note that user acceptance and confidence are crucial for the further development of any new technology.

The introduction of new technology in any organization is often associated with organizational readiness. To define organizational readiness, it describes how employees are prepared and willing to adopt new technology depending on the internal and external organizational factors. IT

infrastructure and top management support are the two organizational factors often mentioned in organizational readiness and technology adoption literature. IT infrastructure is essential for an organization to adopt new applications as it provides the necessary hardware platform, supporting software, computer network, and physical facilities [30]. The more mature an IT infrastructure is, the easier it is for an organization to adapt to any new technology and to improve business performance. Similarly, organizational readiness is also described as "a shared psychological state in which organizational members feel committed to implementing an organizational change and confidence in their collective ability to do so" [3]. On related research, E readiness is defined as the ability of an organizational unit to be prepared, willing to adopt, use and benefit from e-innovations such as procurement, e-learning, e-business, and e-government [2]. Moreover, Organizational readiness for change refers to "the extent to which organizational members are psychologically and behaviorally prepared to implement organizational change" [18]. Coming to the data analytics concept, a study from South African Revenue Services (SARS) by using a close-ended questionnaire about organizational readiness towards data analytics reveals the following result. The collected data was analyzed quantitatively and the findings indicated that technological infrastructure, security, reliability, finances, competitors, customers, and vendors are core antecedents for Data analytic readiness [47]. Related research made on public sector organization suggests that uncertainty about organizational readiness and inability towards data analytics implementation is problematic, therefore, studying the current status of the company readiness is a must before proceeding to implement the tools because it will increase the risk of early implementation failure, which could undermine the success of future data analytics venture in any sector [35].

Recognizing the need and acceptance of new change especially in technology implementation is the first stage in any business, thus academicians are interested to explore the factors that are responsible for user acceptance or rejection of certain technologies. To study these phenomena several models and frameworks have been developed. The significant part of implementing new technology is user acceptance and confidence in usage of the services. Several researches has been made to assess implementation of new technology. Several models and frameworks have been developed to explain user adoption of new technology and these frameworks introduce factors that can affect the adoption as well as implementation of new technology. In the following section these models and frameworks will be discussed in detail.

Several researches are available online that are conducted to explore the factors affecting the implementation and usage of technologies in different sector. Following an intensive literature review on these frameworks and model in IT/IS, the models and theories are based on concepts originated from psychology, sociology, communications, and management. Among the most adopted theories are the theory of reasoned action (TRA), the technology acceptance model (TAM), TAM combined with unified theory of acceptance and use of technology (UTAUT).

These widely accepted models throughout literatures are going to be described in these sections. These models and theories have been applied in a wide variety of domains to understand and to predict users' behavior such as voting, dieting, family planning, donating blood, women's occupational orientations, and breast cancer examination, choice of transport mode, turnover, using birth control pills, education, consumer's purchase behaviors, and computer usage [23]. Several researched in the field of technology acceptance, developed frameworks to assess the usage of particular developed and implemented technology. All the reviewed studies has adopted either traditional frameworks or combined previous models and formulate new constructs to develop and carry out their study.

The widely accepted technology acceptance models and theories are [21]:

- Technology Acceptance model (TAM)
- Theory of Reasoned Action (TRA)
- Theory of Planned Behavior (TPB)
- Diffusion of Innovation (DOI)
- Unified Theory of Acceptance and Use of Technology (UTAUT)

2.3.1Technology Acceptance Model (TAM)

TAM model is known for its two variables known as perceived usefulness and perceive ease of use. Perceived usefulness (PU) is defined as the extent in which any end-user believes that using of a particular service or a system would improve and enhance their job performance [39].

The second variable is called PEOU, this variable is defined as an individual belief that using a particular system-based service requires less effort. It emphasizes the ease of use, how easy the system to use and the level of complexity is determining the usage of a technology [39]. TAM fits for measuring the acceptance of certain technology but some argue it lacks other

consideration which fully describe organizational context and behavioral aspect of workplace [34]. In some studies, it is considered as binary, which consider only the choice of adopting and not adopting a technology. The variables, perceived usefulness and ease of use may not be sufficient criteria in measuring, studying new and emerging technology. It doesn't adequately consider the complexity of actor's decision in using the technology, contingency and context [15][6]

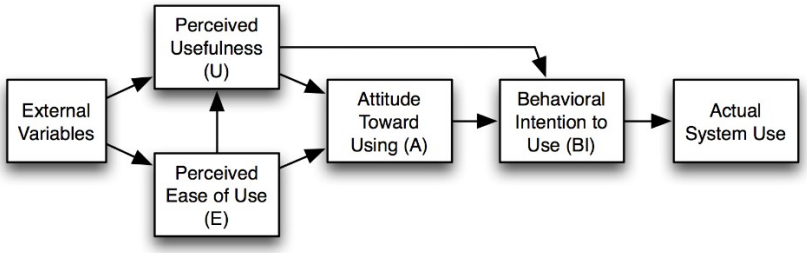

Figure 1 Technology Acceptance Model (TAM) [39]

2.3.2Diffusion Of Innovation (DOI)

DOI explains diffusion of the technologies in two ways. First, it considers the innovativeness of the potential user. Second, it considers the attributes of the innovation, such as its relative advantage, compatibility, complexity, trial ability and observability. Relative advantage is the perception that an innovation is better than the currently used technology. Complexity is the perceived difficulty in using an innovation. Compatibility refers to how consistent a new technology is with the needs, values and experiences of the potential user. Low compatibility will bias the user against adoption. Trial ability is the ability to experiment with an innovation before fully committing to it. Observability reflects the degree to which a potential adopter can see others using the technology and thus the ability to vicariously evaluate it [46].

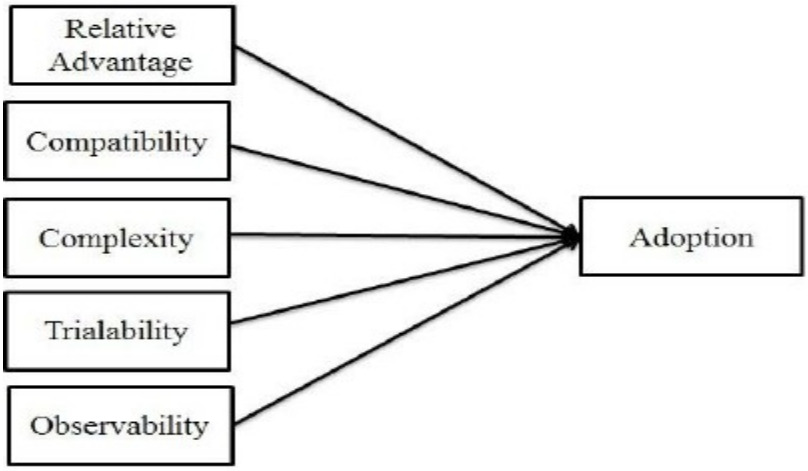

Figure 2 Diffusion of Innovation (DOI) [46]

2.3.3 Theory of Reasoned Action (TRA)

These theories were first developed by Fishbein and Icek Ajezen in 1967 [29]. The theory uses primary constructs to predict behavior and how they will behave based on their previous experience: a person's attitude towards the behavior, the subjective norm and perceived behavioral control which is the person's perception whether the behavior will meet with the approval of others [29]. Generally, the theory aims at explaining the relationship between attitudes and behaviors within human action. It is mainly used to predict how individuals will behave based on their pre-existing attitudes and behavioral intentions. The theory looks at behavioral intention rather than looking in to attitude as the main predictor of individual behavior to accept or reject a product [47].

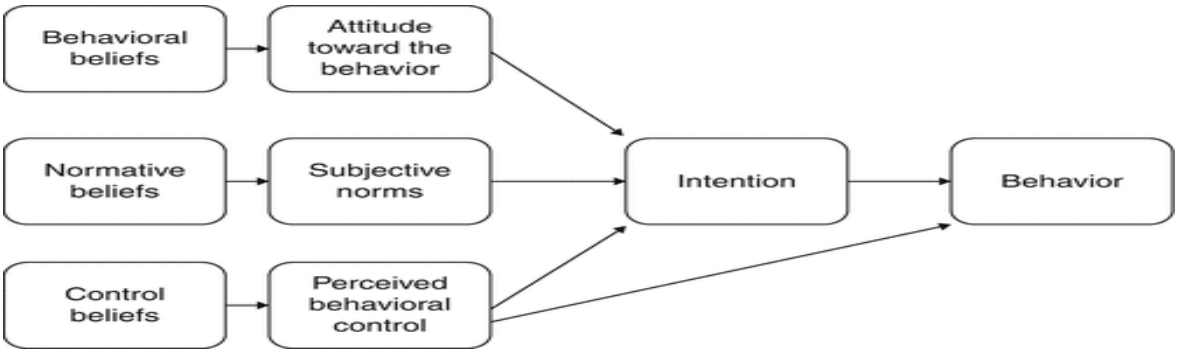

Figure 3 Theory of Reasoned Action (TRA) [29]

2.3.4 Theory of Planned Behavior

Ajzen furthered the TRA by developing the theory of planned behavior by adding perceived behavioral control construct to the two TRA constructs (TPB) [2, 3]. These theory details the influence of three construct that determine the decision of an individual to follow a certain behavior or an individual decision to use a certain product [47]. Attitude towards behavior, subjective norm and perceived behavioral control are the three constructs of these framework.

Subjective norm represents significant views of others that can determine whether one should or should not engage in a certain behavior or product. It's a kind of scenario where by specific groups and individuals think the person should or should not use the product.

The other important construct is attitude towards the behavior which an individual has his/her own judgment, believe or behavior to build positive or negative attitude towards usage of a certain product. The intentions are derived from personal previous experience or individual evaluation.

The third construct, it's a newly added construct, called perceived behavioral control. The construct emphasizes how individual perception towards how easy or difficult the product is to perform the desired behavior. Behaviors that are easy to perform are high perceived behavioral control and others that are difficult to perform has low value in perceived behavioral control. This construct generally incorporates the ease of difficulty and also the pressure the person feels that an individual encounter while using of certain product [48].

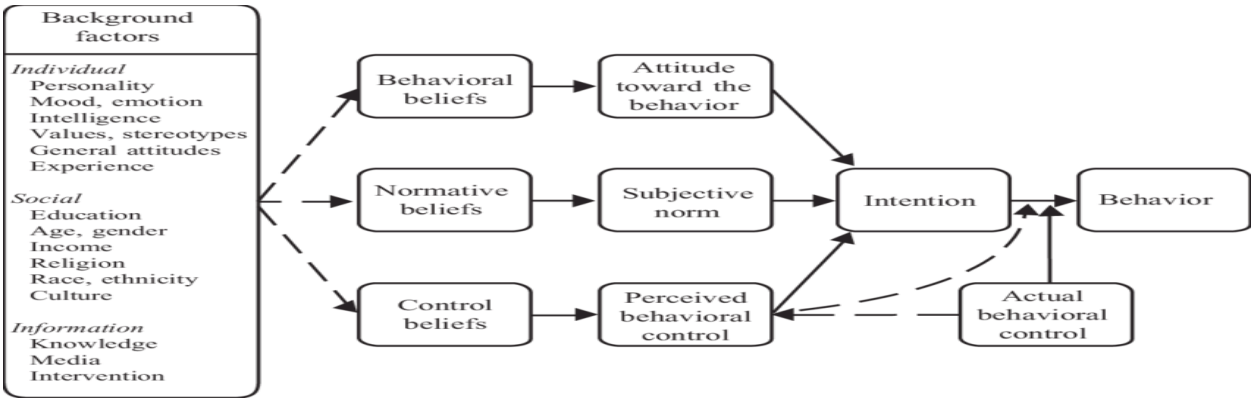

Figure 4 Theory of Planned Behavior (TPB) [47]

2.3.5Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT) model developed by Venkatesh and is a useful starting point to investigate technology adoption. The UTAUT is used to identify factors that influence the intention to use information technology to be adopted by an organization [70]. This model was introduced first in 2003, the model is known to incorporate technology acceptance theories such as TRA, TAM, MM and TPB. According to the UTAUT model, seven constructs are considered as a significant determinant which influence intention or usage in one or more of the individual user acceptance models. Of the seven, Venkatesh theorized only four variables as significant determinant for user acceptance and usage behavior. These four variables are [21]:

- Performance expectancy
- Effort expectancy
- Social influence
- Facilitating conditions.

Researches indicated that UTAUT model yields better explanatory power, and solid reasoning toward IT/IS behavioral intentions toward learning and adoptions [14]. In the perspective of data analytics, an extended UTAUT model had been used in measuring the factors surrounding open data technologies and organizational willingness to adopt the tools [27].

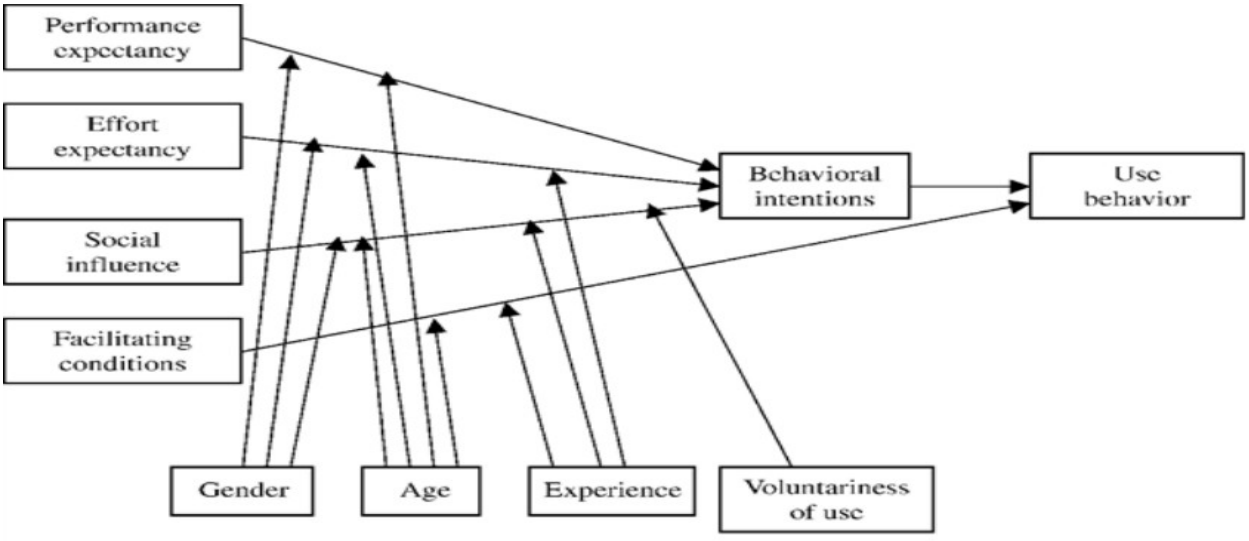

Figure 5 UTAUT Model [70]

Performance expectancy

Performance expectancy is defined as the individual belief that the subject system, tools, or framework can improve his or her work performance [40]. Or it is the integral factor that would influence individuals into learning, using, and continue to use particular technologies. It is the belief that such technologies can significantly elevate the quality of work and increase work performance. Subsequently, studies have shown that strong individual believe on adoption of a technology will have a positive impact on his/her quality of work performance [28]. The propose that performance expectancy captures the constructs of perceived usefulness, extrinsic motivation, job fit, relative advantage and outcome expectations [40].

Effort expectancy

Effort expectancy is also a construct of the UTAUT model that measures the level of ease of use associated with the use of an information technology. It is the 'degree of ease associated with the use of the system' [40]. The essence of effort in this construct is captured by three constructs, Namely Ease of use, complexity and perceived ease of use. Ease of use is defined as the 'degree to which an individual believes that using a particular system would be free of physical and mental effort'. Complexity relates to the degree to which a technology is perceived as relatively difficult to understand and use [41]. The positive influence of performance expectancy towards learning and adoption can be negated by the difficulty on the technology access and usage. Previous researches indicated that the ease of use of any technology has a direct impact on the eventual and continuous usage [40].

Social influence

Social influence defined as the degree to which that others (family, friends, peers, and etc...) believes either positively or negatively will affect someone to use the new system [40].

Social influence takes place when other individuals, group, and society believe that the individual should learn, adopt, and use the subject technology or system particularly if the technology or system can be useful to the individual. Therefore, successful individuals or organizations that had adopted IS/IT technologies have the potential to influence others that have yet to embark [41]. The research also indicates positive relationship between peer recommendations on individual behavioral intentions [22].

Facilitating conditions

Furthermore, facilitating conditions as a construct in UTAUT refers to the extent to which an individual perceives that organizational and technical infrastructures required to use the intended system are available [41].

Facilitating conditions in IS/IT researches mainly refer to training, guidance, infrastructure, and helpdesk support, and these facilitating conditions can improve or hinder IS/IT usages. These conditions are largely determined by indicators such as perceived behavioral control and compatibility [22].

2.4 Related works

Software application acceptance has become a major area of research since the eighties in management information system fields. The continuously varied, augmented, and improved models and theories reflect the change in the importance and functionality of information technology [23]. After conducting an intensive literature review on this area, the dynamic relationship between the end-users and any new technology is critical to the performance as well as for the survival of the technology. Thus, in these sections, the researcher has explored technology acceptance models to serve as the fundamental means for studying the factors influencing end-user adoption and intentions of various technologies. Besides, acceptance has been viewed as a function of user involvement in systems development therefore academic researchers have a rising interest in realizing the factors that drive user's acceptance and rejection of technologies. Several models and frameworks have been developed to explain user adoption of new technologies and these models introduce factors that can affect user acceptance [38]. The highlighted research has defined acceptance as "an antagonism to the term refusal and means the positive decision to use an innovation" [50]. Decision-makers need to know the issues that influence users' decision to use a particular system so they would be able to take them into account during the development phase [49]. It is the common question of both practitioners and researchers that why people accept new technologies. Answering this question may help them to better methods for designing, evaluating, and predicting the response of the users to the new technologies [50].

The benefit of innovations such as information technologies can be limited if the adoption and use is poorly diffused, as effective diffusion requires user acceptance. Poor user acceptance can occur when transitioning from an existing system to a new system such a transition requires users who will readily adopt and utilize the information technology. To address this poor success rate in adoption the characteristic of innovation adopters, individual, and managerial factors that impact the intention to utilize the technology must be well studied [28].

Before the implementation and usage of any new technology, organizational users need to find out how simple the technology is, how compatible the solution is working with current systems and judge this new technology's potential benefits, its relative advantage, compatibility, and simplicity are closely related to the adoption of new technology [34]. Though the study of the emerging technology as data analytics and big data is highly important, for a successful development leverage all the potential benefit of the area, the existing potential challenges, barriers as well as the current status of the industry must be well explored and considered. These proper investigations on barriers to data analytics can facilitate any manufacturing companies to build more effective strategies. Despite recognizing the opportunity of big data application, the institution's readiness to recognize the prospect of the area should be assessed if they are well equipped to use data analytics applications to their fullest [33]. Therefore, these subsections will explore a wide variety of literature to explore the factors that affect organizational acceptance towards these technologies and reveal the applicability of technology adoption frameworks in the field of ICT. It is deemed to be an antecedent of innovation adoption behaviors.

Another related research revealed that any organizations should not start using big data and analytics technology before they are ready, as that could unleash big data's darker side. Breaches of privacy and security of personal data, unfair treatment of citizens through overly extensive and unethical ratification of decision-making processes, wrong or suboptimal decisions because of incorrect data handling, analyses and interpretation, inadequate and faulty IT facilities and large IT investments that never pay off are just a few of the dangers [35].

Another research used Grounded in the TOE factor framework, this study to identify the main factors affecting the organizational adoption of big data in China. The hypotheses state that for organizational users to adopt big data analytics, they need to ready their technological,

organizational, and environmental assets. The empirical results suggest that all three components of Big Data Readiness are indispensable for psychological outcomes. The results provide useful indicators for industries to utilize big data for a more productive business. The result of the research has the purpose of providing a vision for executives to fully utilize big data organization. Accurate assessment can provide management guidelines for the implementation of big data analytics in organizations [48].

Another research on these areas spotted out that behavioral intentions as a major factor in user's acceptance towards new technological changes or adoptions. According to the study, one of the successful outcomes for successful learning intention is the eventual adoption and use of a particular subject that any learner is interested to undertake. The study has categorized the parameters to investigate users learning intention as expectancy-value, attribution, social cognitive, goal-orientation and self-determination which produce four common themes [53]

Related research on the area of IT/IS adoption factors has keen at transformational leadership (TL) as one factor which affects the adoption process. The studies have shown that effective leadership as a crucial factor in inspiring, stimulating, and influencing workforce motivation, morale, creativity, and performance [22]. The study has aligned the leadership vision and workforce readiness through four constructs of TL; inspirational motivation, intellectual stimulation, idealized influence, and individualized consideration. Inspirational motivation indicates leadership acknowledgment on employee contribution towards achieving given tasks that are meaningful to both leader and the organization. Intellectual stimulation points to the encouragement given by the leader towards employees into creating creative methods and means of problem-solving.

To effectively utilize and optimize the said emerging technologies, human resources must be equipped with the necessary knowledge such as digital literacy [36], complex problem solving [37], and decision making [38]. Associated with the specified factors workers in all corporate functions will need to improve their digital literacy, moving from the ability to use basic tools to more advanced digital tools [40]. Based on the latest research by McKinsey Global Institute, there are significant skill mismatches among current workforce knowledge versus digital economy technologies with data analytics as the topmost mismatch [30].

A recent study conducted by McKinsey analytics quotient, for more than 20 banks in Europe, Middle East, and Africa by assessing their maturity across six dimensions revealed the following five areas where banks can improve to adopt the big data analytics effectively [30].

1. Embed analytics into decision making and workflows: The study revealed that there is absence of change management program to drive adoption or culture that fails to support data driven decision making and rapid agile iterations.
2. Align analytics priorities to strategic vision: For more than half of the banks surveyed analytics is a strategic theme, but failed to connect the high-level analytics strategy to a targeted selection and implementing them as planned.
3. Develop advanced-analytics assets and teams to scale: Even though most successful organization gain the most benefit of analytics through advanced – analytics centers of excellence (COEs), The study discovered that most banks have launched single, stand-alone initiative in advanced and failed to develop their analytics in to efficient and large-scale operations.
4. Invest in critical analytics roles: Even though banks are having an expanding demand for technical profiles there is a challenge in discovering “translators”. These translators are link between business and analytics typically come from the business team to help the data scientist to understand, prioritize and ensure the analytics insights are communicated back to business units.
5. Enable the user revolution: Companies typically impose formal constraints on data security, privacy, and compliance, but few define clear data ownership and maintain high-quality data that is ready for application to develop analytics use cases.

Companies and other organizations and policymakers need to address considerable challenges if they are to capture the full potential of data analytics. A shortage of the analytical and managerial talent necessary to make the most of big data is a significant and pressing challenge and one that companies and policymakers can begin to address in the near term. Studies have noted that executives’ attitudes toward the technology innovation have a strong influence on the information technology adoption decision [17]. Other challenges the researchers addressed in their report include the need to ensure that the right infrastructure is in place and that incentives and competition are in place to encourage continued innovation; that the economic benefits to

users, organizations, and the economy are properly understood; and that safeguards are in place to address public concerns of the sector. Even though more and more organizations are adopting big data analytics tools, its diffusion is still far from realizing its full potential due to issues like security concerns, fear of losing control, and organizational resistance [7].

A study conducted on the Dutch public sector has confirmed that organizations may be technically capable of using big data analytics technology but will not be able to significantly gain from the activity if the applications do not fit their organizations and main statutory tasks [35].

As suggested by studies, many organizations aren't sure of how to maximize the demonstrable value presented by data, leave alone being ready for such a big change. Many organization managers are more concerned with the cost associated with the storage of such data, rather than the value in it [54]. Organizations should discard such worries and get ready to embark on the analytical journey that could lead them to draw better insight from data. However, this requires organizations to be ready for change in all aspects including cultural, strategic, and operational. Studies have indicated that numerous factors are accountable for influencing data analytics adoption in companies. However, like any technology, these factors may differ from one organization to another. These include; Management Support, Organization size, Finances, ICT infrastructure, Scalability, Security, Competition, Customers, and vendors [5]:

Abinaya in 2015 [58] recommends that for successful developments and applications of data analytics, the current existing potential challenges and barriers need an extensive study. These challenges are funding needs, infrastructure and related factors, knowledge and research evidence, leadership and governance, security and interoperability, and socio-cultural and technological environments. The most fundamental challenge of data analytics is to explore a large volume of data and extract the useful information or knowledge [6]. The most fundamental challenge of data analytics is to explore a large volume of data and extract the useful information or knowledge. Furthermore, it requires careful data management including data governance of the data sources, data quality, data content, data access and security, data consistency, and user training. To provide authentic, accurate, and reliable data essential for good decision making in the banking sector. Similarly, another research has explored four potential challenges of

implementing data analytics adoption in Lebanon banks. The challenges include investments in analytics, the effort needed to explore a large volume of unstructured data to extract useful information, having less skilled human resources to cope and analyze the extracted data and privacy concerns. During the diffusion process for data, its definition and capabilities must first come to the attention of executives before it can be more widely accepted. As a new information technology, data analysis can be considered to be an innovation application for organizations [2].

Related research extends the UTAUT with transformational leadership (TL) as a moderating variable on investigating factors influencing BD&A learning intentions among Malaysian SME executives. The anticipated findings provide a guideline for policymakers especially towards the development of human resources transformation focusing on BD&A or other emerging technologies and BD&A program providers [14]. Since data analytics is also a form of IS/IT adoption, the success of technology-based learning depends upon learners' acceptance of the technology; therefore, their acceptance should be a key concern for administrators and educators when considering the implementation of learning [40]. Apart from the challenges of adopting big data analytics, the benefits are endless. Effective integration of such data using data mining and informatics may result in lower costs and improved customer services via well-informed decision making, this in turn will influence cost reduction. According to the "World Retail Banking Report" published in 2016, banks that apply analytics to customer data have a 4%-point lead in market share over banks that do not [60]. Related with the facilitator factors, another research has studied motivating factors for big data analytics adoption about retail banking. These are the ease or affordability of financial transaction; availability of new data source offers a significant new opportunity. For this matter, big data in retail banking assist in screening new application for risk of default, to identify high-risk borrowers for auto loan [12]

2.5 Summary

Currently, there is ongoing attention that is given to data, data analytics, and other data-driven technologies. This is because of the arising knowledge from academic's professionals, the innovativeness of the sector in transforming organizations, enterprises as well as nation's economy [13]. These section of the paper documents the basic concepts of data analytics, the consolidated definition covering related concepts of data-driven approaches like big data its

benefit in enterprise and organization, what metrics define the size, other characteristics and related technologies that exist to harness the potential of data in detail.

The literature review has been useful in exploring resourceful research agenda in data analytics area. Based on the reviewed literatures data analytics technology is not an easy task, academicians have documented several cases of resistance on different sectors in response to adopting the technology. Along with a lot of factors with its implementation, currently these analytics technology is viewed as one of the most influential current emerging technologies in the digital economy and has emerged as one of the most sought after and studied information systems (IS) and information technology (IT) subjects [5]. In organization that leverage IT, data is now coming from various sources and in different formats making such organizations to be data rich but knowledge poor [55]. However, based on the reviewed literatures data by itself has less value, however it will become more advantageous if processed and used for business process. Most of the review literatures has confirmed that data analytics is now becoming a top priority for many organizations as they expect to derive intuitions from the analyzed data to improve productivity, enhance the customer experience, cut costs as well as seizing new business opportunities. On the other side despite all the possible benefit of these tools, studies has confirmed that most projects related with data analytics implementation projects are lagging by high cost of infrastructure and lack of business cased that is required to integrate data sources.

Researchers conducted in Ethiopia has also been reviewed to understand the current theoretical understanding of data analytics in our country context. Based on the findings, the local research on data analytics and related areas revealed that prior IT/IS studies did not empirically investigate on behavioral intention of the end users as well as organizational perspective of the area in adopting the data analytics technology. The researches were more directed toward user developing an application for data analytics technology [8], [10], [11], [26], [27].

Related researches conducted abroad has also been reviewed, as seen in above section most of the studies has adopted quantitative approach to study the technology acceptance. Quite often this makes the researchers unable to comprehensively analyze complex relationship like the interaction between end users and technology. Also, the focus on quantitative questionnaire-based survey may lead to oversee relevant factors of influence [23].

In general, based on the reviewed literatures, the use of data analytics tool can unlock significant value in such areas as product and market development, operational efficiency, market demand predictions, decision making, and customer experience and loyalty. But the listed advantages of using the technology cannot be granted, unless there is proper investigations on barriers and accelerator factors to data analytics, Thus to facilitate the sectors to build more effective strategy in adopting these technologies. Hence as a focus of these research specifically aimed at investigating of factors that positively or negatively affect the data analytics adoption.

CHAPTER THREE

METHODOLOGY

3.1 Overview

The research methodology is a set of processes used to collect and analyze data. It deals with the methods and principles that are used in the research. It explains how the research is done the methods of data collection, the materials used, the subject's interview, the theories used and the data analysis technique [19]. It also gives reasons on why a particular method is used.

The general aim of this research is to explore the factors that affect data analytics tools implementation at financial institutes of Ethiopia. This chapter presents the methodology that is used to achieve the objective of the study. First, general approach and inquiry method is presented. This is followed by defining data source population and sampling, identifying data collection and analysis method, and finally validity and reliability is discussed in detail.

3.2 General approach

The general approach of this research is a qualitative research methodology, which is well established with the interpretive research philosophy and with the theory-building inductive approach Qualitative methods rely on text and image data, have unique steps in data analysis, and draw on diverse designs [68]. In this research the researcher has used no predetermined theory or framework to analyze the collected interview data; instead the interview data is used to derive the analysis structure. The analysis process involves several procedures that aim to explain, understand and interpret the collected data. Therefore, the source of the research evidence is qualitatively collected interview data. The reason for choosing this methodology is discussed below.

As seen in the above in literature review section as well as a recent meta-analysis on technology acceptance researches revealed that most of the conducted studies into acceptance of technology researches, apply predominantly quantitative methods which have defects when the finding shall be implemented in practice [23]. Nonetheless, few studies that are conducted with qualitative methods show that more factors and results can be achieved that are beyond well-known

theories. Quantitative researches are often done by combining existing theories and the final results will harden the chance of unknown constructs to find entry into the model [23]. After the end of the 19th century researchers in the IS field have been encouraged to use more qualitative research methods instead of quantitative ones, while the later are still dominant a tendency towards a greater acceptance of qualitative methods is discerned

As a result, it is believed that, such constructs that are not included in some models of quantitative research might have high relevance to explain technology acceptance [23]. Researches on the advantage of qualitative based methodologies indicates that, questionnaire-based quantitative study may lead to the negligence of relevant variables which has a greatest value in affecting a certain technology adoption. However, study of technology acceptance with qualitative method shows greater result than well-known theories [23]. Therefore, the choice of proceeding with qualitative study is linked with the intention of carrying a fine collection of practices revealing all undiscovered concept of the factors for data analytics usage and implementation.

Another reason to choose qualitative study is, recommendation from related researches. Most of the conducted researches in these areas adopt quantitative methodology and rare researches have adopted qualitative approach to study the acceptance of new technologies. Quantitative analysis methodology aims to expose and test the relationship between framework variables by applying statistical methods to investigate how certain variables affect the adoption of technology. Furthermore, those researches recommend future researches to be held leveraging the use of other approaches like qualitative or a mixture of both to get more insights needed to determine technology implementation factors [22][24][47].

In addition to recommendation from the above authors, the available researches in data analytics area tend to focus on technical implementation of the technology. In accordance with the technical implementation, organizational perspective on perception of the technology and factors that are affecting the implementation of these technologies needs to be explored. For this purpose, as one of the strongest research methodologies, Qualitative research has the ability to represent the views and perspectives of the participants as one of its major purpose [68]. Thus, the events and ideas emerging from qualitative research can represent the meanings given to real-

life events by the people who live them, not the values, preconceptions, or meanings held by researchers.

In addition, these approaches allow a researcher to examine complex organizational setting as well [74]. Studying this research area qualitatively provides detailed textual description of the area how organizations are experiencing the technology and more human side of the issues like behaviors, relationships and opinion of the practitioners. Therefore, capturing the banking sector perspectives in regard to using analytics tools is the major purpose of this research.

The adopted methodology is designed in a manner that will help in revealing the perception of the research target groups with reference to the factors affecting the usage of data analytics tool. As one of the most common qualitative research methods, one-on-one personal interview with one respondent at a time is conducted. This is purely a conversational method and invites opportunities to get detail information from the target groups. The data of this research is collected following the approach [51].

3.3Research Design

A research Design is a systematic approach to and strategy that any researcher chooses to collect analyze and interpret the research data in coherent and logical way thereby it insures to address the research problem effectively. It generally constitutes the blue print for collection, measurement and analysis of data [51].

In this research, the researcher aims to exhibit the advantages of a qualitative approach. Therefore, interview is applied with different groups of experts from different private banks to reveal the factors which impact the acceptance as well as the implementation of data analytics tools. Another goal of the inquiry is also to ask for best practices and concrete recommendations for the implementation of this kind of software application. Domain-specific construct which is regarded as relevant to technology acceptance substantiates to be improved with a qualitative course of action. Finally, the finding is consolidated in a theme which is not only useful to explain the factors of the technology acceptance but also allows for concrete recommendation. Thus, this research clarifies the theoretical perspective of data analytics and its application in the banking and financial sector of Ethiopia using qualitative research methodology. The reason for choosing this methodology is discussed on general approach section of these research.

3.3.1 Planning the research

The research questions of this research are:

- What are the main inhibitor factors contributed for lagging behind the data analytics adoption of Ethiopian banks?
- Which attributes, features and characteristics of Data analytics tools has significant influence on the acceptance of the tools? Regarding facilitator factor.

The intention of the above research questions is to address different organizational factors as variables which affect the implementation of data analytics in Ethiopian private banks. As stated above the research methodology applied in this research is qualitative approach using semi-structure interview. Interviews are used as the primary method of data collection of this research, while preparing the interview question, each question is directly tied to the research question. First research questions were typed out bold and underneath at least five questions were formulated accordingly. The next technique to refine the interview question is by constructing a matric. At this phase Interview questions are listed in vertical axis and research question in horizontal axis this can further indicate the extent to which the interview questions have achieved the necessary coverage of the research question (Sample can be referred on appendix I section table 4).

After formulating sample interview question for each of the research question the researcher came up with 18 interview questions that aimed to answer the research questions at hand. Then preliminary/ pilot test for the interview question was made with the pilot interviews and the questions are revised a bit until they directly refer to answer all the research question.

Therefore, qualitative research with the use of an in-depth interview with the concerned sample in selected banks is used in collecting data from the selected financial institution with the aim of exploring on the uncertainty as well as motivator factors for data analytics tools implementation. As summarized a study, there are three forms of interview that are designed to obtain thick and rich data; these are, Informal conversational interview, General interview guide and Standardized open-ended interview questions [6]. For this research, standardized open ended interview guide is adopted. The question for each respondent is identical but the question for each is structured so

that the responses are open-ended. This open-endedness allows the participants to contribute as much detailed information as they desire and it also allows the researcher to ask probing questions as a means of follow-up [4]. While reviewing qualitative research, suggests that using of standardized open-ended interview allows the participant to fully express their viewpoint and experience. The reason to choose open ended interview is because it guides the researcher via interview protocol. It does maintain some structure but also provide the researcher with the ability to probe the participant for additional detail [56]. Semi-structured interviews with the concerned data analytics experts from IT department allow the researcher to diagnose the bank's strategic orientation of innovation and data analytics challenges and roles.

The procedure in conducting interview follows the following steps. Participants selected from IT department based on their experience, role in decision making and relevancy to the study. To achieve the best result and to answer the above questions interviewees are carefully chosen according to their experience and qualification to cover multi-perspective scope of the tools used. Then recording method are established using recorder tool, interview conducted, data is transcribed and the result finally is compiled and analyzed using NVivo software.

3.3.2 Study population and sampling

Samples in qualitative research tend to be small in order to support the depth of case-oriented analysis that is fundamental to this mode of inquiry [19]. Additionally, qualitative samples are purposive, which are selected by virtue of their capacity to provide richly-textured information, relevant to the phenomenon under investigation. For this research, criterion-based sampling is adopted because qualified candidate that will provide credible information are highly required. Creswell also suggest participant should be chosen based on their willingness in sharing their experience openly and honestly [6][51].

A discussion about participants and site include aspects identified by Miles and Huberman [80]:

a) The setting: The setting describes where the research takes place therefore for studying the factors affecting big data analytics adoption, Ethiopian private banks which implement data analytics tools are chosen as study sector. The choice of the banks depends on their current market share, their level of recognition at both national and regional level. Furthermore, as

described in above section all the interview is conducted via phone call. Due to the current COVID-19 pandemic all the arranged face to face interview is cancelled and the respondent agreed to conduct the interview via a phone call. Therefore, the setting chosen for conducting the interview is phone call conversation. Interviewees were given the right to choose the appropriate time to conduct the interview so that they feel comfortable in answering each question without feeling restricted to share their information. For each interview in average 50 minutes of interview was conducted with all the 5 respondents and transcribed interview took almost 20 pages.

b) The actors: Selecting the appropriate respondent for an interview is crucial phase and here the actors are the main participant of the research. Participants of this research are the employees in the IT department of private banks which resides at Head office in Addis Ababa. Here it should be noted that the banks chosen for this research are required to implement one of data analytics tool for their daily operation. After confirming that the banks have appropriate tool the interview participants are selected from IT department based on their experience, role in decision making and relevancy to the study. Hence, the research follows a qualitative study, the targeted population is small in size which range 5 IT department employees from 5 different private banks.

3.3.3 Preparation and conducting the interview

The most critical step in conducting this research is interview question preparation and conducting of the interview, since this phase can alleviate or aggravate the circumstances once the research is implemented. At the beginning, the preparation stage is the most crucial part in order to maintain unambiguous focus to provide maximum benefit to the proposed research study [63].

For the purpose of this research, McNamara principles to the preparation stages have been followed. These steps are stated below

1. Choose setting with little distraction: Each respondent was asked their favorable time to arrange so that the respondent is comfortable in answering each question at their own places, work or home so that they will not feel restricted to share their information.

2. Explain the purpose of interview: The purpose of conducting the interview is explicitly explained to the interviews so that they have a better understanding of the purpose and goal of this research and all have agreed to be a part of this research.
3. Address terms of confidentiality: All the interviewees insisted the confidentiality of their bank information as well as their personal information like name and their corresponding bank detail to be kept unrevealed. For this reason, each interviewee's personal/ bank detail information is kept private.
4. Explain the format of interview: Before conducting the interviews the type and the nature of the questions were explained to the respondent. If they have any comment, their questions and suggestions were taken into considerations
5. Time: Each interviewee is aware of the amount of time it takes to conduct the interview. The time was estimated based on the result of pilot test which is around 50 minutes for each respondent.
6. Informing the interviewee how to get in contact with the researcher later if they needed to
7. Asking the respondent if they have any question unclear ambiguity, they have during the conversation
8. Asking permission: In this phase, all respondents were asked their voluntariness in recording their voice for analysis and request them to speak slowly and loudly as we are conducting the interview via phone call, the recorded data might get prone to noise.

3.3.3.1 Pilot testing:

Before conducting the pilot interview, interview questions have been shared to each participant to create a common understanding of the research area. Then a preliminary pilot interview has been conducted with 2 volunteers who have similar work experience. This pilot interview data assisted the researcher in understanding the work environment regarding data analytics environments. Other than this it assist the researcher in determining if there are flaws, limitation or any other weakness in designing the interview and make the necessary revision before conducting the real interview.

After taking into account a considerable correction and editing the content of the question new questions were added, irrelevant and redundant ones are removed for preciseness and effectiveness of the questions in answering all the research questions.

After preparing interview question that could answer the research question the next step is selection the participant. This phase is crucial part of conducting the interview. Researches have asserted various type of sampling strategy. For this research, criterion-based sampling is adopted because qualified candidate that provide credible information are highly required. Creswell also suggest participant should be chosen based on their willingness in sharing their experience openly and honestly [54].

3.3.3.2Conducting the interview

During the interview all respondents has shown a full interest in participating in the research. At the start of each interview start-up talk was used to lift the spirit as well as to ensure there is a common understanding of the research area. Also, interviews are asked for the voluntariness in recording their voice to ensure the transcription afterwards and all the respondent has agreed on recording process.

For this research 5 interviews have been conducted in 3 weeks with selected qualified experts from 5 different banks which prove to implement analytics tools in their business operation. The background data of the respondents revealed that 4 are Male and 1 Female and with all of them we conduct the interview in Amharic.

Every participant is asked semi-structured interview to describe a typical data analytics tools that is implemented in their bank as well as different organizational and personal factors that affect the implementation process of the tools.

The interview consists of 20 questions. The interview questions are formed by following recommendation of MCnamara, to create an efficient and effective research question the following recommendations are adopted [79].

- The questions are open ended to allow the respondent to choose their own terms when answering questions.
- Questions were neutral as possible to avoid wording that might influence answers, for instance evocative and judgmental wordings were avoided.
- One question was asked at a time so that the respondent would not lose focus and concentration towards answering a question.
- Questions were worded clearly.

3.3.4 Data collection methods and instruments

"Qualitative researchers collect data themselves through examining documents, observing behavior, or interviewing participants but the researchers are the ones who actually gather the information" [68]. Different methods of data collections are available for qualitative research. The commonly used are interview, discussion, observation, focus group and document analysis. While conducting this research the researcher tends to collect data in the field at the site of the sampled banks where participants are the one who has experience in working on the tools this up-close information gathered by actually talking directly to people as a result the researcher has direct communication with the participants over time. For this research, data collection method and instrument suggestion are adopted from Creswell [51] having the following steps:

First, the boundary of the study is sated. As seen on the scope of the research, the state line of this research is to explore the barrier, facilitator factor and the motivation behind implementing data analytics tool in Ethiopian private banks. After formulating interview question the required information is collected via semi-structured interview from concerned organs.

As described above, the target population is selected from IT department and an in-depth interview is chosen as a main inference then data and information collection phase proceed. As one of the most common qualitative research methods, one-on-one personal interview with one respondent at a time conducted with employees whose work is directly related with working in this tool. After discussing the purpose of the research, the researcher started interview. This is purely a conversational method and invites opportunities to get detail information about the detail information of the tools they are using, challenges they faced and motivational factors of implementing the tools from the target groups. In this research the researcher develops and use an interview protocol for asking questions and recording answers during the interview. This information is recorded in the form of handwritten note and by audiotaping. A digital voice recorder was used to record the interview discussions. Per recommendation from other qualitative researches everything during the interview discussion has been recorded though it's very difficult to choose relevant information. In addition, there are times where by respondents provide too much information to combat this issue researcher assist the interviewee to be guided and focused on the interview question. During the interview, the research has been taking the main notes taken out of the interview. Finally, the research data collection was completed during

the theoretical saturation is on point. Theoretical saturation is said to be met when additional responses doesn't lead to formation of new information [38].

3.3.5 Data analysis strategy

Qualitative researches prepare and organize the data analysis through transcribe data and matrix source [42]. After conducting the interview each participant answer is recorded via recorder. The data collected via the audiotape then is manually transcribed by the researcher and saved in Microsoft word file. These transcripts are the main analysis units of the research.

As described earlier, the interviews were conducted via telephone and are recorded on audiotape recorder. The records were then transcribed immediately because it's recommended to transcribe the record the moment the interview is completed to keep the data fresh [51]. After the transcription is completed the researcher has send the transcribed document to each respondent to check and verify if the transcription and the extracted information is correct.

An Inductive approach for analysis of qualitative data is adopted. Generally, the purpose of using this approach is to condense raw textual data in to summary format, to create a clear link between the research objective and summary derived from the collected data and to develop a framework of the underlying structure of experience or processes.

The commonly used data analysis method for this research is planned to produce both an in-depth understanding of the financial institution's motivation, facilitator as well as to explore on barrier factors for the implementation of these tools. The following figure 6 shows the basic process of coding the interview data

The Coding Process in Inductive Analysis

Initial reading of text data	Identify specific text segments related to objectives	Label the segments of text to create categories	Reduce overlap and redundancy among the categories	Create a model incorporating most important categories
Many pages of text	Many segments of text	30 to 40 categories	15 to 20 categories	3 to 8 categories

Source: Adapted from Creswell (2002, p. 266, Figure 9.4) by permission of Pearson Education, Inc. (© 2002, Upper Saddle River, NJ).

Figure 6 Coding process in Inductive analysis [12]

Qualitative researches are known to build their own patterns and themes from the bottom up by organizing data to abstract units of information. This inductive process shows working back and forth between the themes until comprehensive set of themes are organized [51]. In general, the intent of this section is to make sense out of interview and document analysis data. These phases involve segmenting and taking apart the data as well as putting it back together to formulate a theme. For analyzing the data collected through interview, a thematic analysis is conducted to identify patterns of themes.

Thematic analysis is a method of analyzing qualitative data. It is usually applied to a set of text, such as interview transcripts. The goal of a thematic analysis is to identify themes, i.e. patterns in the data that are important or interesting and are used to address the research. This is much more than simply summarizing the data; a good thematic analysis interprets and makes sense of it.

This research follows six-phase guide by [51].

Step 1: Become familiar with the data:

The first step in any qualitative analysis is reading, and re-reading the transcripts. The researcher has gone through all the transcribed script to have a basic understanding and concepts of the answers given.

Step 2: Generate initial codes:

According to researches, codes are tags or labels for assigning units of meaning in describing compiled meaning in research [20]. In this research coding was done manually by utilizing Microsoft word to highlight the text in which the researcher is interested in. One or more color was used for each interview then each highlighted theme is organized in another document. After refining the analyzed highlighted codes, the researcher starts to organize the collected data in a meaningful and systematic way and finally these codes are used as nodes while analyzing the data on NVIVO. While analyzing the interview data on NVIVO the researcher has highlighted categories that can represent the data, then this are assigned to nodes that can represent a group of nodes. This reduction is used to generate theoretical constructs, which accommodate large chunk of data. The data analysis was taken iteratively until saturation. This task is actually very time-consuming process.

Popular and effective method of qualitative data interpretation has been applied to formulate the necessary initial code and the process follows the following steps:

- Word and phrase repetition: after the primary data is scanned enough repeatedly frequent data's, words and phrases were categorized.
- Primary and secondary data comparison: Here after figuring out the most commonly used themes, the findings are compared with published literature.
- Search for missing information: Each finding codes and themes are examined intensively if there are some issues that was not mentioned by the respondents.
- Metaphors and analogues: So finally, the themes and code findings are compared with a phenomenon from other published researches

Coding process reduce the lots of data into small chunks of meaning. There are different ways to code and the method is determined the research questions. After acquiring interview data, hand coding is a laborious and time-consuming process, thus qualitative software programs is adopted to organize, sort and search for information in the data. Therefore, the data consolidated from the interview is carried out with NVIVO. Electronic techniques of data coding are gradually being introduced to obtain rigor finding. Moreover, using a NVIVO is one of well-known qualitative research tool which is designed to help in organizing, analyzing and finding an insight from qualitative data like: interview or open-ended surveys. Then categories identified are ranked and sorted by relevance.

Step 3: Search for themes:

As defined earlier, a theme is a pattern that captures something significant or interesting about the data and/or research question. Based on the results found in this research, the result of the collected interview resulted in formation of 9 themes which will be discussed in the next chapter.

Step 4: Review themes:

During this phase preliminary themes that have been identified on step 3 is modified and developed.

Step 5: Define themes:

This is the final refinement of the themes and the aim is to 'identify the 'essence' of what each theme is about.'

Step 6: Writing-up:

Usually the end-point of research is some kind of report, often a journal article or dissertation.

3.4 Mechanisms to assure the quality of the study

The quality of this thesis is assured by validity, member checking and reliability. These concepts are used in a lot of literatures to strengthen the credibility and trustworthiness of researches. The validity explores the extent of the investigated area and reliability entails the steadiness and consistence of the methodologies and procedures. Validity is a process of determining whether the findings are accurate from the standpoint of the researcher, the participant, or the readers of an account [67]. Yin [64], highlighted that a way to do a content validity during qualitative studies is to allow experts within the field of study review questions prior to data collection [64]. Considering the above statements emphasis by previous academic scholars, the researcher adhered to this concept by sending the interview guide to the targeted IT data analytics experts for cross validation and examination. After that valuable recommendation was taken into consideration thus necessary incorrectness, duplicate interview questions and irrelevant ones were removed. This procedure helps the researcher to increase the quality of the interview questions and strength the study. Any finding or conclusion in the final research must likely be

more convincing and accurate, this is done based by using the strategies suggested by Creswell [51].

Member checking: accuracy of the qualitative findings through taking the final report or specific descriptions or themes back to participants and determining whether these participants feel that they are accurate. This does not mean taking back the raw transcripts to check for accuracy rather major findings of the research are taken back.

In order to ensure credibility of resources the literature for this study is compiled from academic libraries, and professional websites and affiliates. Literature included in this report is studied with regard to authority and objectivity of the source, quality of the material, coverage of the topic, and currency. Scholarly works contain proper citations and references; authors are examined for institutional affiliations and previous publications to determine professional competence; and the quality of publications produced by professional associations are considered for the value they bring to the community of specialization.

Gibbs [80] suggested several qualitative reliability procedures:

- Check transcripts to make sure that they do not contain obvious mistakes made during transcription.
- Make sure that there is not a drift in the definition of codes, a shift in the meaning of the codes during the process of coding. This can be accomplished by constantly comparing data with the codes and by writing memos about the codes and their definitions.
- Cross-check codes developed by different researchers by comparing results that are independently derived. Proposal writers need to include several of these procedures as evidence that they will have consistent results in their proposed study.

Reliability is also achieved by providing detail description of research procedures. The use of a digital voice recorder also increased the trustworthiness of the research because it reduces misinterpretation of respondents' views due to errors in note taking. In addition, descriptions of the research procedures with visual diagrams were provided to allow readers to follow the chain of evidence. All the procedures taken place has been described and documented so that other people can review and try to understand them and it is also available for inspection too. The general idea is to securitize the work and the evidence to support the finding and conclusions.

CHAPTER FOUR

RESULT

This chapter discusses the result of the conducted interviews. As described in previous chapter the interview questions were structured with respect to answering each of the research questions.

The final result of this study is presented by describing the key findings of the interview questions. First coding was done manually using Microsoft and words that the researcher find interesting are highlighted. One or more color was used for each interview then each highlighted theme is organized in another document. After refining the analyzed highlighted codes, the researcher starts to organize the collected data in a meaningful and systematic way and finally these codes are used as nodes while analyzing the data on NVIVO.

4.1 General Overview

After analyzing the interview data using NVIVO software, a number of similar codes categorized. Then each data and similar codes are emerged to form theme. Hence, the result of the collected interview resulted in formation of 9 themes. In this chapter an analysis of the respondents' views with regard to the use, possible challenge and facilitator factors of the analytics tool are discussed in detail. Each theme is then categorized as motivational factors, facilitator factors and challenging factors for the implementation of the tool. These themes are:

1. External factor
2. Relative advantage
3. Top level Management
4. IT infrastructure
5. Facilitator factors
6. Human resource
7. Data management
8. Ease of use
9. Customization

The categorized themes are discussed on the next section based on their intensity. To have a better view of the respondent, the researcher has categorized each respondent background and work experience in working on these tools. Table 1 below shows a precise description of tool implemented in each of the sample banks for descriptive and predictive data analytics.

Respondent	Role	Tool implemented	Purpose of Analytics
R1	Technical tester and IT support Officer	Customer relationship management	Descriptive and predictive
R2	Implementation project team supervisor	NUll	Descriptive 75% Predictive 25%
R3	Project team member and IT support officer	Insight business analytics	Descriptive
R4	Senior technical support officer	SAP business analytics	Descriptive
R5	Senior Database engineer	Oracle business intelligence publisher	Descriptive
		Microsoft Business intelligence	

Table 1description of respondent and implemented data analytics tool

4.2 External factor

In implementation of a new technology the importance of external factors that can influence the firm decision in implementing the technology is crucial element to take into consideration. These themes discuss the characteristic of external pressure that influence the banks in using the technology. This section discourses about the identified motivational factors that influence the banks for implementing these data analytics tools. These external environments include factors that are beyond the immediate control of management and are one of the major influencers towards technology adoption [33], [26]. These factors are known to create challenges and opportunities that any company need to consider. Such factors include environmental context, the activities of customers, competitors, suppliers, market, government or economy that has direct influence on company decision to implement one technology or not [66]. The result of the interview revealed the main element of external factor is competition.

Competition: As highlighted in the previous chapters, as technology advances and competition increase, the banks are offering different types of services to stay current and attract customers. Due to high and variable demands of their end users, these sectors are undergoing huge reforms and digitalization. The nature of the sector has always been extremely competitive. This phenomenon has been mentioned by three of the respondents. Some of the banks are now experiencing recent emerging technology towards operational innovation therefore in order to sustain and compete with leading banks, news tools are now beginning to be implemented.

According to R_4 implementing these tools enables their top-level managers to have a better understanding of their bank profit, customer detail and current status. As a result, this better insight of their data and information enable them to make a sufficient strategic plan that will make the bank to sustain in these extremely competent environment

> *"Lastly implementing these tools enable the bank to provide a quick response to its customers enquiry as well as the top-level managers are now having the basic information about the status of the bank this help them in constructing plan which helps our bank to have competitive advantage."*

R_1 has also similar idea with R_4 saying "*Other factors like external factor, competition from other bank force the bank to implement these tools because our strategic plan is to be competent with other banks and to provide best service and become profitable."*

R_2 as well address the main motivation behind implementing these tools, Similar idea was raised additionally the banks are now emerging themselves in using of new technology as one of their strategic plans.

> *"In my opinion for instance one bank has its own strategic plan to sustain in the market and one of the most significant strategy made by our top managers is to implement and have updated technology and also to enhance every service with better technology than its competitors."*

Similarly, some of the banks has implemented these tools because of prior experience of using the old version of the same tool. Other bank has implemented the tool by using their research team, these team has its own aim in exploring the current trend and other banks best practice and

new services of local or international banks. R_4 has explained this phenomenon in the following way:

> *"While doing any new project we have our own research team which explore the best practice of other banks so before deploying the application we try to see the best practice of other bank in addition to this while doing any new project we have our own research team which explore the best practice of other banks."*

Similar response has also been also given by R_5

> *"So before deploying the application we try to see the best practice of other bank and the Business intelligence publisher is chosen because we had a chance to see the tool when used by other banks."*

The other motivation factor is the intention of having a great image on the market in implementing these or any other emerging technologies because each bank requires its services to be seen as one of the leading in the market. The banks are now trying and implementing new technology to improve their process and workflow by optimizing the business and by implementing appropriate technology advancements include to be the leader in implementing new technology that will assist their bank to have a good image in leading the technology. R_1 has explained these as following

> *"And also, we want to have different way of treating our customers especially in campaigning and marketing plans so that we can have a good impression of our services to the end-users and as leading bank we want to keep the status as leading in technology implementations as well."*

Based on analyzed interview data the market competition, reviewing other banks best practice or researching others best practice and the intention of having good image in providing the best services are the main external factors that are motivating the banks in implementing these analytics tools.

4.3 Relative Advantage:

The second theme in motivational factor is the relative advantage of the tool as highlighted in previously especially in literature review section, relative advantage is the perception that an

innovation is better than the currently used technology. Generally, its defined as the degree to which using a particular IT service perceived as significant in respect to improved job performance or output compared with the previously used service [66]. For this study the relative advantages of Implementing these analytics tools has been explored because relative advantages are one of the main variables that needs to be studied while new technologies are implemented [34]. These advantages are considered as significant in improving the performance of each bank in serving their customer as well as in performing their daily operation in management level as well as in operational level.

Generally, in this theme the researcher categorizes each end users' responses towards the relative advantage of implementing these tools under top level managers and operational end users. Most of the respondent has confirmed that they are using the analytics tools for having a full information about their customer and transactional history accordingly. The tools assist them in viewing consolidated and analyzed data of their customer, the number of accounts, the number of products and retail information. This consolidated and precise report enables them to make strategic plan for each bank. Therefore, these analytics tools enable all of the sampled banks to view their current performance so they are able to make strategic, short and immediate decision whenever they needed. The following table summarizes the possible answers of each respondent in tabular form which only describes the advantages of implementing this tool for managerial and operational end users

Respondent	TOP level managers	Operational users
R1	Enables the top-level managers to make efficient decision about their customer that will enhance the relation between the customer and the bank	Enables each branch users to have full and detail information of the bank customer in a single click
	Enables the top-level managers to have 360-degree view of each of their customers	Enable the branch users to see their current status in marketing and campaign operations
	Able to monitor the ongoing campaign, monitor and control each operation related with customer management	

R2	The tool analyzes huge amount of customer data and produce a repot which assist top level managers in making decision.	The centralized feature of the tool enables the branch end users to entertain their customer request in quick and faster manner.
	Based on insight from the data they will operate on new branch opening, new product creation, remove products that are useless	Enable the branch users to view their daily transactional report in consolidated manner
	The insight generated from the data will be used for resource mobilization based on performance	
R_3	The management has an access to view the number of accounts, the number of new products and retail information	Enable them to view only their customer's data including transactional history.
	The top-level managers can see and monitor each branches performance, deposit and profit clearly	
R_4	Descriptive data will be presented to the top-level managers, directors and regional officers used for decision making	The operational users have their own interface so that they can retrieve any information about their branch customers easily.
	The consolidated report fastens the managers to plan for the future and to upgrade their service whenever needed.	
R_5	The top-level managers are provided with descriptive data of the bank with visualization which assist them in making decision and strategic plan.	the lower operational users can have an access to see the detail transaction of their branch, their GL report and other reports that will enable them to monitor their daily operation
	The dashboards are designed to assist the top-level managers in understanding the current status, profit, loss and other information of the bank	

Table 2Description of key advantages of implementing the analytics tool

4.4 Top Level management

In this theme, all factors related with top management support and related concepts are organized together. These tools implementation can't be effective without organizational support, both from the top and lower-level employees. While conducting the interview the top-level management in supporting the implementation as well as how the lack of their support impressed the implementation and usage of the technology has been mentioned several times. As highlighted in the literature review section, top management support is the main organizational factor often mentioned in organizational technology adoption literatures. On some banks, the

top-level managers have shown great contribution during and after the implementation of the tool this support has enabled the banks to exploit the potential benefit of the tool.

Here is a sample quoted statement given by R_5 which states the kind of incentive that has been given by the top-level managers and how it impacts their performance positively.

> *"So, they really appreciate the implementation of the tool by deciding on giving motivation and support and deciding to give incentive to participants at the end of the implementation……. The first thing to consider is the top-level managers must be well aware because they are the one to approve the resource and support with the required infrastructure."*

Similarly, R_5 has added the same idea as R_4

> *"There was a support from the top-level manager specially after seeing the output of the dashboard the management has given the team a big recognition this I believe has motivated us to even exploit and work more on feature of the tool so it will assist them in decision making"*

In addition to giving recognition and incentive to the employee's top-level management support can also be described in terms of their responsiveness towards any new requirement or any changes that emerge during the project implementation. R_1 has described this phenomenon in the following manner:

> *"The managers specially the top once has supported the implementation of these project, this include for instance there are times where crucial decisions are required to proceed and during these times the managers had done a lot of immediate meetings to decide on matters. This enables the whole project to be completed in the specified time"*

Similarly, R_2 has given an emphasis on the significant contribution of having a supportive and motivational top-level manager and in addition, the respondent believed that having top level managers with IT back ground or any experience in working with these analytics tool has made the implementation process to be more effective.

> *"The top-level management in supporting the implementation of these technology is unquestionable. If there was no support from them totally the project wouldn't even be*

started or ended……For your information There was a management change in the bank and fortunately the bank were able to acquire experienced team managers from other banks and they did share their knowledge to our team so this enable the project team, so their effortless guidance specially foe the IT teams has enabled us in using and customizing the tool to our bank context. ”

On the other hand, the less contribution of the top-level management has made one of the sample banks to be less effective in exploiting the advantages of the tools. R_3 believed that having a good top-level manager with experience and knowhow of the sector might enable their bank to use the system effectively.

“As I told you earlier there is high employees’ turnover and most managers that participated on the project has resigned and due to this human resource problem and huge knowledge transfer gap the newly assigned managers might not even know if the bank adopted this tool. So, these lead less focus to be given for exploiting the full potential of the tools”

4.5 IT infrastructure:

IT infrastructure and top management support are the two organizational factors often mentioned in organizational readiness and technology adoption literatures. IT infrastructure is essential for an organization to adopt new applications as it provides the composite hardware, necessary software , network resources and services, computer knowledge and other physical facilities for the existence and operation of IT environment[30]. So, based on their significant contribution in implementing these analytics tools, each respondent has been asked the challenge they are facing at their bank in regard to these infrastructures and all agreed that these infrastructures are the backbone of implementing these technologies and all banks are facing biggest challenges due to limited resource of the infrastructure and necessity to implement these tools. Generally based on the interview data technological and infrastructure requirements are couple of challenges in implementation of data analytics tools.

While implementing these tools any issue related with IT infrastructure is leading the banks to halt their effort in usage of the system and exploiting its functionality fully, as stated by R_4,

"As I said we are using the descriptive functionality of the tool the reason is there is high infrastructure issue to support all the functionality of the tool ……. The other point to consider is these tools require high availability of IT infrastructure with higher performance."

IT infrastructure theme contains any issue and challenge they have faced related with network, storage servers and operating system as well as databases. All of the interviewed sampled bank has faced serve performance issue due to limited system capability. The statement is stated below by R_1 and R_2

"Plus, while migrating to production environment there was insufficient resource related with server preparation on both hardware and software application resources this has created a big impact while implementing the tools…. Therefore, when the system has more users and more access points the bank will increase accordingly. But at the first time of implementation the bank cannot offer the requested IT infrastructure resource."

"Technically we have faced an issue of system performance issue because at the first trial there was an issue related with performance and this was because the Memory and hardware capacity, we have been very limited to run large and intense queries…. For now, we have purchased huge processors to fully exploit the feature of data warehouse but for the future there might be storage issue"

R_3 has also given the emphasis of having sufficient IT infrastructure and in reality, having insufficient infrastructure is hindering the team from performing the analysis for long period of time data analysis

"Since we have limitation of infrastructure and updated feature of the tool it only does analysis for the past 6 months only, but if the infrastructure is well equipped the system can do analysis for more than the specified period……the operation requires high volume of bandwidth therefore the access is granted only for the chief level managers and head office selected organs… The biggest challenge we have is an infrastructure of IT as I said earlier the tool can perform a lot but due to lack of updated and sufficient infrastructure, we cannot use the system fully"

Other aspect of IT infrastructure challenge is that some of queries required high performance computing processors and the end users might encounter system performance issue frequently. R_5 has shared the experience the challenge the bank has faced related with insufficient IT infrastructure.

> *"There are performance and slowness issue encountering while trying to retrieve and running an intensive query from the data. There are times where large queries needs to be run or other scenarios where concurrent users need to run certain queries at the same times during these times due to insufficient IT infrastructure system slowness might encountered and to resolve this kind of issue, we have limited the access grant to specific users."*

4.6 Facilitator factor

In previous theme it has been seen that data analytics having different relative advantages and functionality but to take more advantage of these tool the current factors that facilitate the implementation of the tools in the sample banks needs to be well explored. The qualitative result indicates that majority of respondents point the power of providing an adequate training as a major facilitator factor that enhance the skill of the employees in using the technology. Three of the respondents has emphasized the major effect of providing training especially for IT users and how it assists them in enhancing their performance and also enabling them in exploring more and working more on the tools. Along with training sufficient documents of business requirement are necessary to achieve the best result while designing new required reports when needed.

R-4 has emphasized how the lack of training and updated guidance on usage of the technology is affecting their performance negatively and how it impacts their team in lack of knowledge to exploit the full functionality of the tools.

> *"Honestly regarding this tool there no sufficient training or resources that can make us capable for implementing the technology and exploring more on the tools……In my opinion lack of sufficient training for the end user defects our team to wards using the full potential of the tool so that even IT staffs cannot build a skill on the tool"*

R2 and R1 has explained the detail advantages of conducting an intensive training especially for

the business users because as per the response there was a significant resistance on adopting and usage of the new analytics tool report. After successfully implementing these tools end-users from business side feel confused about switching from traditional methods because they were familiar with the way things were done. The business teams were resistance in using the new one rather they prefer using the old one so here the bank has used training to broaden their understanding about the tools and to convince them the major advantage of the tool for their business operation and finally the team was successful in convincing the end users in usage of the tool. So in addition to enhancing the skill training was used as a technique to enhance the end users acceptance of the tool

> *"But accordingly, we give them an intensive training the worth of using the new application and we were successful in convincing the end users and at the end they even change the resistance to opportunity …….. they gave us training to make us more advanced on usage of the tools"*

Similar to the above R1 has explained the importance of training in the following way:

> *"Training focus tend towards the benefit of the system so that end users will be convinced to use the system without fear this approach has enabled our team to beat the resistance that came from the business team"*

Apart from the training R3 and R2 described the advantages of preparing a sufficient business requirement document which help in understanding the business requirement and to design reports based on the requirement. Here the respondent clarifies the need of having business objective document and which assist in understanding the business gap and requirement to be filled by implementing the tool.

> *"We could have been benefited more from it, if there was a training and manual document for guiding the usage and implementation of the tool…… while the project was on progress manuals were not made which might guide the self-service and usage of the technology so updated manuals were not prepared at the time. …. To get the full advantage of these tool increasing the skill of the employees through updated training and preparation of document related with the tool is the best practice to be followed "*

Similarly, R_2 has added the same idea regarding preparing business requirement with almost *similar expression with R3 saying:*

"……. One of the best practices I prescribe for other sector with the plan of implementing the technology is before adoption of the technology every requirement and deep understanding of the business is needed. So there needs to be a business requirement document."

4.7 Human resource

Human resource is one of the themes explored during the interview. As highlighted in literature review section human resource is the most fundamental requirement while adopting any technology or new workflow. When we come to these analytics tool the human resource of each bank must be equipped with knowledge, problem solving skill and understanding the basic business concept of the sector. Workers are encouraged to improve their digital literacy while using the basic tools up to more advanced digital tools [40]. Even a recent study by MCkinsey global institute has showed a significant skill mismatch among the workforce and the digital economy technologies [30]. Therefore, to explore the trend and the challenge related with human resource interview questions were asked regarding the current skill and status of the employees of the sampled banks. According to answer gathered from the respondent all of them has given emphasis on having a human power with both business and IT background is required and acquiring resources with prior experience in working in this tool is the major success factor for the implementation of the tool. In addition to having skillful employee the increased resignation and turnover rate of the employees has shown a great negative impact on the sustainability of the tool. But generally going through all respondent answer has shown that most of them are struggling due to lack of talented employee in this sector. Employees has less knowledge in running in-depth data analytics. R_4 emphasize the importance of acquiring human power with prior experience working on the tools and described how having less experienced employees has impacted the usage of the tools.

"If we have at least some people who have experience in working on the tool, I believe that could make the process of learning easy but since we all were new for the technology learning and exploring its advantage at first it was not easy, The second-best practice we have is the team members are experienced in using the tools in their previous work"

R_2 has also described the newness of the tools and that there are less skilled professional in

Ethiopia and emphasize the lack of knowledgeable staffs that could have efficient skill in working on the tools

> *"Now I don't think there are skilled enough human power in Ethiopia in general there is a lot to learn and develop in these sector……. still there is a huge knowledge and skill gap in the sector. And the knowledge and skill to maintain the system is its infant stage. …. finding skillful employees in this sector is very difficult."*

R_3 has also give a big emphasis regarding having sufficiently skilled employees in addition to the idea to other respondent. How the resignation and turnover rate of the skilled employees has negative impact on usage of the tool is described in detail here.

> *"As I have told you almost all of the active participant during the implementation phase has resigned from the company. So, the one who replace them were new for the technology and they honestly get scared even to use it. Plus, since the technology is an emerging one the employees are not skilled enough. These is due to lack of knowledge sharing from previous employees"*.

Another major challenge faced by each of the banks is shortage of professionals who has IT background and understand the basic concept of the data and financial concepts at the same time there is a sharp shortage of employees who have the basic knowledge of the business aligned with the IT understanding. All the respondent R2, R3 and R5 has given a big emphasis on having human resource that have both knowledge.

> *"In order to use the tool both IT and business knowledge is required. The main purpose of using the tool is to automate the business process so one user of the system from IT side must know the business concept ……And also having IT team with knowledge of both IT and business is required /"*

> *"Some tools might not even need the programming / coding effort, but in those tools that doesn't require coding skill needs a basic and deep understanding of the business. Because one of the challenges we had faced is the fact that we have low knowledge of the business on the other hand those who know the business has less friendly approach with the tools. So, having the deep knowledge of the business was the biggest challenge we had faced ….*

There was a huge challenge in having staff who knows both IT and business at the same time was very biggest challenge we had in implementing the technology, as we have discussed earlier there is a skill problem"

> *"The difficult part is designing report according to business requirement, Because it requires basic understanding of the business concepts …..…..Employees lack the knowledge where the data available on the core banking , where the tables are located , and also knowing the meaning of the data interpreting the meaning one must know the financial term and concept so technically using of these tools require the knowledge of business in depth…..the main challenge here is knowing what someone got to do with the tool the main question is if new request come from any department one must know the business concept so that he/she will be ablet to convert it into query and get the right information"*

4.8 Data management

These themes discuss about the challenges that these tool implementers have faced called data management issue. With so much transactional available data the most difficult part is to dig out the insight from its Data management issues raised by the respondents are related with the difficulty of analyzing that come across different channel that are hosted in different system which might lead to incomplete or inaccurate analysis. Another issue is related with data with inaccurate or null values and a key cause of these data are manual error made during data entry from branch users. Nothing is more harmful than having these kinds of error data's and lead to having unreliable output and this might lead to negative consequence because most of the banks are using the analytics tool to make effective decisions. Compiled view of the respondent response shows a great challenge were encountered related with missing data, inconsistent data and duplicate data which all result in data quality challenges.

R_4 has explained this phenomenon in the following manner

> *"One of the technical issues we faced during implementation is a data cleansing problem because end users from branch side fail to fill the important data of a customer. Due to human made error there were a lot of data anomalies, missing fields*

and error prone data's and this was one of the biggest challenges that our team has faced."

R_1 also described the challenge their team has faced due to these data management and related issues

"There were multiple tasks that needs to be done by the bank team prior to going live these tasks include data cleansing and data preparation due to poor value of data and other various reason these data were not fully prepared migrated to the CRM database for the well use of the system"

4.9 Ease of use

In technology acceptance models ease of use is defined as an individual believe that using a particular system service if it requires less effort. It emphasizes the ease of use, how easy is the system to use and its level of complexity in determining the usage of technology [39]. This theme categorizes each respondent response the challenge they have faced in using of this tool which is only related with the ease of use of the tools. Based on the analysis made banks that have implemented the updated tools has less issue related with the system complexity but others who adopted older version of the tools are experiencing a great deal of a challenge in using the system sufficiently due to the complexity of the interface. And, also the newness of the technology introduces new work flow and new words that needs to be understood by the end users.

R_1 has explained this newness of the technology and how it introduces new words that are not known previously and how it impact the implementation in slight significance

"I can say it's easy and not complex and has user friendly interface…. the complex part is may be the system introduce new jargon words which are unfamiliar with current work flow of the bank … New process, new approach and new solutions were introduced and it took a bit of time to cope and work with these processes."

R_2 has added similar idea with R_1 emphasizing the new concepts introduced along with the tool's implementation has arisen a bit of challenge in adapting and working with the tools

"Because the tool is new the languages used are also new so learning these tools for the first time was not easy…. It might be easy for experienced person, for anyone who has an IT background I can't say it's easy"

R_3 has also emphasis the complexity of using the system that it was not easy and requires a bit of skill to understand the concept and to work with the tools

"NO, it was not the system is very complicated than the other system we own. … Unless there is good training on how to use it even the interface is not easy to get……. Even usage of the dashboard is not easy. Has a lot of menu and submenus, huge number of tables with huge volume of data I think this is also one reason why most of its users are not attracted enough to use it. So, the system is not user-friendly needs a lot of skill to even use it"

R_5 in the ease of use has different idea as their bank purchased the latest tool the system interface is now less complicated and has enabled them to explore on the system without much of effort.

"BIP is less complicated and require less effort to understand …. after deploying the applications, the end user interface is not that complicated to work with."

4.10 Customization:

Based on the analysis made on the respondent data all the banks have implemented the customized version of the tools and all are facing a huge struggle in personalizing the tools based on their business requirement. Even though customization and personalization of core banking service is common in most banks most of them do not use it as well as they should. This is a result of not having a correct business requirement documents and also other issues related with vendor management. R_1 in this regard has described the challenge they have faced during customization of the tool.

"The longer time is taken for customizing the product to fit in to our bank structure. The tool is beyond the bank requirement therefore some processes are not purchased yet but the bank has plan in purchasing those when needed"

R_2 and R_3 has also emphasis the investment related with customization as a biggest challenge during the implementation

> *"Of Corse there is a huge mismatch of system requirement while adopting the tools and the main task as an IT team was to customize the system based on our requirement and need so the huge part of our investment was related with system customization because there was a need to categorize which part is needed and which part should be voided"*

> *"No, it doesn't fit directly with our bank culture there needs to be customization which takes 60% from the vendors and 40% was customized by our internal IT staff and customizing already made tools to fit into the current data of our bank was the biggest challenge that our team has faced"*

CHAPTER FIVE

DISCUSSION

This chapter presents the findings that have emerged from this study. In this section, the objective of the thesis, the problem identified, the challenges and facilitator factor for the implementation of this technology are presented. As it has been explained in the beginning this thesis aims to explore possible facilitator factor, inhibitor factor, and challenges that financial institutes face while implementing data analytics tool. Thus, the researcher conducted an in-depth, semi-structured interview with five IT support officers whose work is directly related to working with these tools to answer the following questions:

1. *What are the main inhibitor factors for data analytics implementation of Ethiopian banks?*
2. *What are the facilitator factors of data analytics implementation in Ethiopian banks?*
3. *What are the factors that motivate the banks to implement this technology?*
4. *How the use of data analytics can be conceptualized in financial institutions of Ethiopia?*

Thus, to answer all the above question the researcher had conducted semi-structure interview with 5 respondent and explore the following themes. These themes were organized based on three categories: i.e., facilitator factor and inhibitor factors and motivational factors. Under each category sub-themes are constructed namely: External factors, relative advantage, top level management, IT infrastructure, Human resource, Data management, Ease of use and customization. The following figure shows a precise representation of the factors that affect the implementation and usage of these tools.

5.1 Thematic Discussion of the finding

5.1.1 Data analytics and its use in financial institutions of Ethiopia

The main objective of this section focuses its intention on the possible data analytics tools and their uses in Ethiopian private banks. The banking sector is known to produce large volume of data compared to most sectors that resides here in Ethiopia. As a result, these sectors are obliged to collect, analyze and store these customer data. Studies have shown that data analytics tools can transform this into opportunities which enable the banks to learn more about their client.

The segmentation of the application of the tools was discussed in detail in literature review section of this thesis.

Based on the empirical finding of these thesis, out of the sampled 5 banks 4 of them are using these tools only for describing and presenting their customer data at hand also known as descriptive analysis. Descriptive analysis is one type of data analytics which uses basic statistics to characterize set of data. The results are shown in terms of averages, totals and other correlation relationship [51]. These analyses took place at every end of day process or during the non-business hours. This is due to a limited resource to compute this analysis parallel along with several financial transactions are taking place. These tools manipulate raw data from different sources, these sources include ATM data, branch operational transaction data, Customer and campaign related data, Mobile banking application data, Internet banking data and Agent generated data.

After the computation of these customer data is finalized, the analyzed data is presented in graphical or audiovisual formats. The tools implemented in each of the banks have the ability to make metrics on the available customer transactional data and present it to the top-level managers in GUI, and allow them to view precise visualization on dashboards. The data visualizations show the graphical representation of total, generalized and consolidated customer transactional data by using visual elements like charts, graphs and maps. Note that the visual representation of these transactional data is categorized based on products, each branch consolidated report regarding loan collection report, saving minimum balance, campaign collection, General Ledger, Profit and loss, active and inactive accounts, interest accrual and top bank depositors. Then the banks top level managers embrace these analyzed data to make decision that improve the revenue, efficiency and profit of their banks. As a result, depending on the purpose of the tools all of the banks except one bank have confirmed that the tools are mainly used for top-level managers to make an efficient decision. The banks are using these analyzed data to enable faster and facts-based decision making. In fact, studies have shown that data driven organizations are able to make better strategic plan with operational efficiency, high level of profit and improved customer satisfaction [35].

While exploring the possible application of these tools for banks, studies abroad revealed that banks are now having a 360-degree view of their customers that in turn has enabled them to segment, personalize, track and incorporate their strategies other than decision making [11]. Nonetheless, the private banks in Ethiopia are using the tools mainly for the top-level manager to provide a descriptive report of their customer. As a result, the end users of these tools answer a question of '*what and how many transactions happens at each branch?*' then the result assist them in the decision-making process. As mentioned above the tool implemented in all the sample banks have a capacity of analyzing customer transactional data based on products branches and customers. Additionally, further extra and new kind of reports might be generated based on new users' requirements. Analyzed data presented in the form of graph, chart and audiovisual format is the key source of Information for decision makers.

All the respondents have confirmed that their analytics tools are capable of performing all descriptive, prescriptive, and predictive features of data analyses but due to several reasons which are described in the previous and next chapter, they are not being able to exploit and gain the full advantage of implementing the tools.

The following table 3 illustrates the precise description and usage of the tools at each of the sampled banks, which shows mostly descriptive and minimal predictive analytics.

Respondent	Tool implemented	Type of Analytics	Purpose
R1	Customer relationship management	Descriptive and predictive	Decision making, related with customer management and campaign
R2	IFCAS extraction tool, SQL Developer	Descriptive 75% Predictive 25%	Decision making Resource mobilization
R3	Insight business analytics	Descriptive	Decision making
R4	SAP business analytics	Descriptive	Decision making
R5	Oracle business intelligence publisher	Descriptive	Decision making

	Microsoft Business intelligence		Decision making

Table 3 General overview of usage of analytics tool

5.1.2 Challenges of Data analytics implementation

Since implementing a new technology is always challenging, any company engaging itself in new technologies must understand how to cope up, mitigate and solve the challenges in order to get the intended benefit from the tools. As highlighted in literature review section Utilizing data analytics tool is very important and advantageous in understanding and working with the data at hand. On the other hand, implementing these tools with a lot of challenge and unfavorable environment might unleash the darker sides like breaching of privacy, security of private data, unethical ratification of decision-making process, wrong decision because of incorrect data handling analysis and wrong interpretations [35]. In respect with challenges and inhibitor factor for implementation to data analytics tool this section focuses on elaborating the result which is related with challenges encountered while implementing these tools. The empirical finding led to the conclusion that several inhibitor factors are responsible for lagging behind the implementation of these tools. As a result of these unfavorable factors, it seems like these tools are not being fully utilized to exploit their potential benefit. Finally, after an intense analysis of the respondent data, the researcher organizes the following themes as the main inhibitor factors of the data analytics tool implementation.

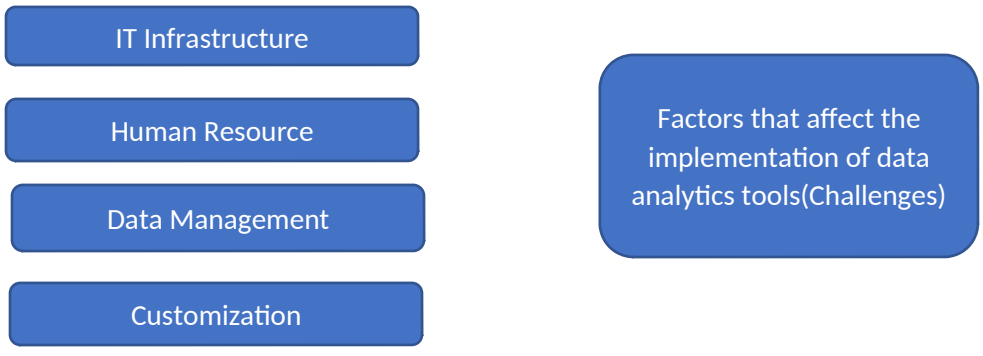

Figure 7:Challenges of data analytics tool implementation

5.1.2.1 IT infrastructure

Broadly speaking information technology infrastructures are facilities that assist the operation and management of the IT environment. These facilities include hardware, software, networking, and operating system components [17]. These infrastructures are essential for the banks to implement and use these tools. as it provides the necessary hardware platform, supporting software, computer network, and physical facilities. As portrayed in the literature, the more mature an IT infrastructure is, the easier it is for an organization to adapt to any new technology and to improve business performance. It doesn't matter if any company owns the best software without having the optimal processing power and storage capacity as a foundation [30].

Coming to the data storage infrastructure four of the bank uses a mirror database that synch along with the production database. Every tool related with data analytics is integrated with these databases to enhance the performance, as well as to reduce issue related with system slowness on the core banking services. Only one bank is having a data warehouse to store current as well as historical data in a single place.

However, lack of sufficient infrastructure can harm the banks in many ways. One of the key challenges analyzed from the respondent is ensuring the right infrastructure is in the right place or at the right time. This phenomenon is clearly described by all of the respondents. All the banks that implement these tools cannot efficiently and proactively utilize all benefits of these tools due to an insufficient IT infrastructure architecture. For data analytics these infrastructures include databases, data warehouses, statistical and data mining services, applications, utilities and systems that are used for either preparing data for modeling, estimating models or other related activities. As highlighted in the first section of these chapter, four of the respondents out of five have confirmed that their analytics tool is capable of performing all descriptive, prescriptive, and predictive analyses but due to limited IT infrastructure. Insufficient bandwidth, limited infrastructure design and server resources they cannot exploit the full advantage of the tool.

Even in two of the banks, the end user interface of these tool access is granted only for top level managers and directors because the system capability in handling concurrent and intensive

queries is very low. Large queries, viewing at reports or graphs slow down the performance and even there are times where production databases go offline due to these intense queries.

Literature in these fields suggests that the infrastructure at hand must have the power to meet the current needs of the end users of the tools and grow to meet their expanding needs [37],[39],[42]. Therefore, infrastructure must be an early part of any planning while implementing any technology. Therefore, the infrastructure must be designed to enable new level of patterns, new end-users' requirements and insights to retrieve from existing data. In addition, its features should be highly flexible and scalable and tuned for today big data environment.

5.1.2.2 Human resource

These themes categorize all factors related to skilled human power resources. These resources refer to all skilled enough, trained, energetic, and experienced employees that are capable of doing a specific task in a balanced and efficient way. In technology adoption and implementation literature, human resources are the main factors affecting the implementation as well as the usage of technologies and most studies have affirmed the advantage of having human resources that are equipped with the necessary knowledge and digital literacy [36].

As highlighted in all the section of these research, data analytics technologies and software solutions are important solution but data engineers, business analyst and other professionals are the key in implementing effective use of these technologies. Following the available skilled human resource, this research has found out that there is a high potential challenge of having skilled human resources to cope up and analyze the extracted data. In all the sampled banks it is unlikely that they have in-house data expert in a big data and hence partnership and outsourcing in developing and implementing of these tools is a must. Also, as the technology is emerging and new for our country sectors, there is a lack of human resources that have prior experience in working on these tools. To effectively work with these tools data visualization and machine learning skills are required from IT staffs to make an informed decision based on raw transactional data. In addition, some have confirmed that the high turnover of employees has created a big impact on the usage of the tools as there is a knowledge gap and knowledge transfer issue. Going through all the respondent's concern, the primary challenge that most banks has faced is, IT technicians who are working in these tools lack the basic business concept.

In the current business environment, the data analyst must be knowledgeable about the business and should be equipped with a great communication skill to share ideas on going forward in usage of these tools. This business concept is very helpful in understanding the business requirement. As their main purpose, these tools are designed to achieve the business objective of the bank therefore to work efficiently on these tools one must have a basic understanding of the financial business concepts. The result shows that, there is a big challenge in understanding the business requirement, and changing those requirements into a data analytics tool query is becoming the toughest part of working in these tools. The database implemented at each of the bank contains several tables that are related with each other and understanding each table content is the basic to understand the business user's requirement. As a result, Mastering the business concept and skill for IT technicians has been the biggest challenge and acquiring human resources that has both technical and business concepts is scare.

5.1.2.3 Data Management

These themes discuss the overall challenges the banks have faced related to data management and handling. The broad definition of data management is the process of acquiring, validating, storing and processing data to ensure accessibility for the end users [51]. Data management can be very complex for huge data sets especially when it comes from different sources as a result managing and maintain this huge volume of data is becoming the main challenge in data analytics fields [35]. As highlighted in literature review section currently banks abroad are storing and managing their customer data in order to explore new knowledge and pattern to learn more about their customer, to personalize their customer experience, to identify marketing insight and failures, to add value to customer requirement and gain competitive advantage. In these regards, all the sampled banks are very good at collecting customer transaction data but the responses show that they are not managing it well enough to make sense of it. While working on these tools managing the data is crucial step in handling the large volume of data. Based on the acquired responses, working on these tools has challenges when it comes to data management. In all cases there are times especially at the first stage of the implementation of the tools, while migrating the data to a new storage database or warehouse which requires a lot of data pre-processing. At the initial phase, the responses of all respondent confirm the challenge related with poor quality data. This problem happens when the data that is feed into the system is with

poor quality. When these data are migrated to the new environment for analysis, there are lots of missing, inconsistent, and duplicate data that requires careful data management which might affect the analysis phase undesirably. The other problem arises from a phenomenon where by when data are not recorded according to the standards set on each customer data fields, this is a very serious matter as the data needs to be migrated to new databases or data warehouses. As a result, Acquiring, preparing, and storing data that is ready for analysis is the challenging part of the analysis. The output of the analysis might be unreliable and can lead to poor decision making.

5.1.2.4 Customization

Customization in the IT sector is the process of delivering services which are modified to meet specific business needs and requirement. In these theme challenges related to customization of the tools to fit into the bank workflow and culture has been discussed. The empirical data gathered from the respondent has shown that a greater challenge was faced while customizing these tools to meet the business objective of the bank. Based on the finding all the tools implemented on each of the banks are purchased from outsourced foreign companies. In all the banks in house teams were given a chance to customize the tools with their bank business requirement. In all the banks the goal was to create a custom-made tool based on their needs. During this phase lack of internal expertise on working on these tools has created a big impact on successful implementation of the tools. At the very beginning these tools are designed in complex logics and has a lot of features that are not even compatible with the current banks business processes.

Additionally, the customization challenges arouse while addressing the unique business requirement and workflow of each bank. Indeed, as explained in human resource theme, it is hard to find the right expertise on data analytics in external market. Due to its newness in usage in Ethiopia, there is a constant shortage of professionals in these sectors. Based on the respondent's response, these custom software developments are the biggest challenge that all the banks have faced. In addition, in all the banks there is lack of proper business requirement document, this stem from failing to choose the right candidates while requirement gathering. As a result, without having a proper plan, the customizations of these tools were time consuming and complex.

Another reason for the complexity of these customization process is the constant changing of branches/ business teams' requirements. Not surprisingly, all of the respondents of these research consider building products with undocumented requirements, as their biggest challenge. Therefore, the effort of customizing the tools to meet each bank business requirement is challenging, time-consuming, and is enforcing the banks to invest extra cost and loss.

5.1.3 Motivational Factors

Factors that motivate the banks to implement this technology

Several theories have been developed to explain the factors that affect technology adoption. These studies have explored into different crucial factor in inspiring, stimulating, and influencing one company in adopting and implementing new technology. Despite of the challenges and facilitator factors these section focuses on organizing the themes related with motivational factors for data analytics implementation in the sampled banks. Research question related with what motivate the bank to implement the technology is categorized under this section. Therefor based on the thematic data the, these motivational factors are categorized into external factors and relative advantage.

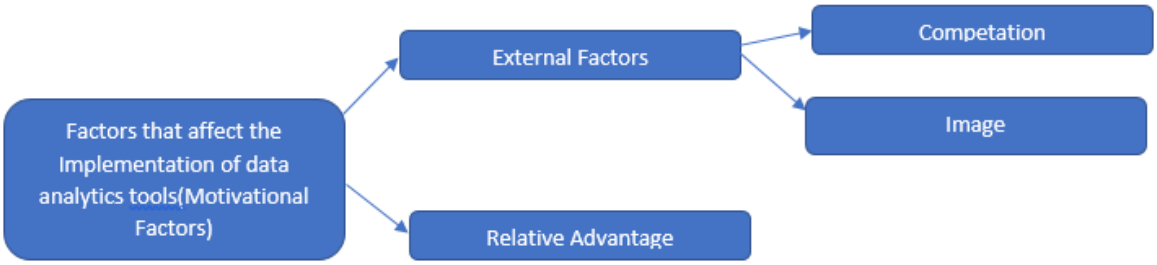

Figure 8:Motivational factors data analytics implementation

5.1.3.1 External factors

This theme discusses the identified external factors that influence the banks for adopting data analytics tools. This external environment includes factors that are beyond the immediate control of management and are one of the major influencers towards technology adoption. Based on the surveyed literatures external factors that affect organization in implementing new work flow are political, social or economic factors. These kinds of factors are well explained in UTAUT model

under social influence variable, Social influence takes place when other individuals, group, and society believe that the individual should learn, adopt, and use the subject technology or system particularly if the technology or system can be useful to the individual. Therefore, successful individuals or organizations that had adopted IS/IT technologies have the potential to influence others that have yet to embark [41]. The research also indicates positive relationship between peer recommendations on individual behavioral intentions.

The result of the interview revealed elements of external factors that influence the banks in implementing the technology.

Competition: As highlighted in literatures the banking sector is one of the highly competitive sectors known to exist in the market**.** To gain this competitive advantage a company must take strategic, extensive research and investment in marketing [21]. The competition held in these sectors is intense due to their special function of the banks in financial systems. In these aggressive competitions each of the bank try to adopt and implement new technology to distinguish itself and to be come in the top of the industry. The financial sectors currently are encountering unpredictable changes over the last couple of years. In order to compete and survive in the computational market each of the stakeholders considers answering questions of profitability, customer enquiry and handling and formulating strategic plan for highest potential revenue growth. According to the result the tool is enabling end users of each of the sampled banks to have a better view of their bank, profit, loss, customer detail and their current status. As a result, having the consolidated view of their bank data, enabled them to make tactical strategic plan in sustaining and competing in the market.

5.1.3.2 Relative Advantage

Another important theme explored from the respondent data is the relative advantage of implementing these tools at their bank. This section focusses on particularly on how these tools enhanced the performance of end users and how these tools has improved the engagement and the advantage of using the tools. These advantages are considered significant in improving the performance of the daily operation of top-level and operational end-users. Based on the empirical data the relative advantage of implementing these tools is limited to be used only by the top-level managers. In all the sampled banks there was already implemented report tool which is

integrated with core banking service and due to increasing user demand and transactional data's, those tools were unable to process and handle all user enquiries and results in halting and slowing the performance of the core banking service. Coming to these tools all the sampled banks have integrated tool with the core banking but on different but synched environment. Mirrored data bases and data warehouses ensure continuous data availability and minimize downtime of core banking service. These features of the tools having separate integration environment assist them in viewing real time consolidated and analyzed data of their customer, the number of accounts, the number of products. As a result, these consolidated and precise report enables them to make a strategic plan for each bank. Its confirmed by all the respondents that the new tools implemented in each bank has improved feature in terms of speed compared with the old versions.

In bank where customer relationship management (CRM) tool implemented sales / customer relationship officers are able to leverage the input from the tool to identify the pattern of campaign activity and their customer financial background to provide personalized products and investments. In other bank these tools are also being used for resource mobilization. As the bank goal is reached based on each branch performance these tools generate descriptive figure of the current performance and assist the bank in allocating the appropriate budget, to know what will work and what needs to be changed.

5.1.4 Facilitator Factors

Facilitator factors of data analytics implementation in Ethiopian banks?

There are certain product or technology service characteristics that affect the diffusion and usage of technology which can influence the end user acceptance and usage. While implementing these tools at each banks the result indicates that top level management, ease of use and other facilitator factors like training, support, motivation and incentives are known to be the positive factors that facilitate the implementation and usage of the tools.

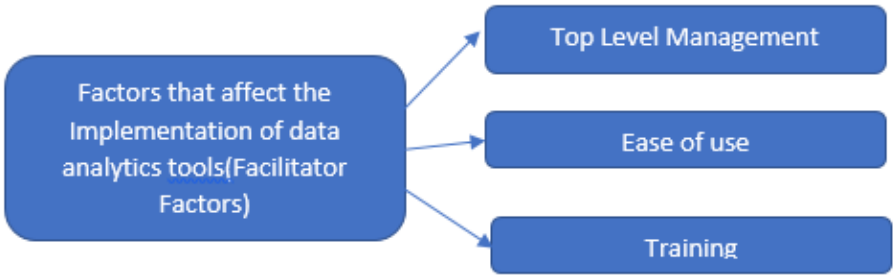

Figure 9:Facilitator factors of Data analytics tool implementation

5.1.4.1Top-level management

Top management support is the main organizational factor often mentioned in organizational technology adoption literature [28], [30], [65]. The empirical data has shown that the effect of top-level managers and their potential benefit in exploiting and implementation of the tools has a major positive impact on implementation and usage of these tools. Having managers who are highly responsive, highly motivational, prior knowledge in working on the tools, and managers with IT background are the most effective ones in assisting the whole implementation as well as controlling the sustainability of the tools while implementation and use. Based on the result even applying or implementing technology effectively doesn't grant end users to be motivated towards using it but top-level managers must become more organized and needs to work together with the team. Even after deployment of these tools end-users might tend to use the older version and might also rely more on human decision rather than automated presentations. To mitigate these trust issue on the system top-level managers did also impose the new workflow procedures to make these tools as part of every operation and ensure the concerned departments can benefit from it.

Furthermore, different ways have been proposed by the respondent that facilitate the effect the top-level managers have on implementation of the tools. These are for instance, motivating and supporting employees and building suitable atmosphere in the office area. Literatures in this regard suggest that top level manager's responsibility is not only offering vision and strategies

but are also responsible for supporting the change and new technology implementation and showing commitment to ensure a successful adoption [4]. In addition to other factors it's the top-level management that decides to proceed to innovate or not.

5.1.4.2 Ease of Use

Ease of use is one of the critical variables which has a lot of coverage in most of technology acceptance related studies [23],[26],[40]. It is defined as an individual's belief that using a particular system requires less effort. Previous researches indicated that the ease of use of any technology has a direct impact on the eventual and continuous usage [40]. Here the researcher identifies system issues related to complexity and ease of use of the tools. The result revealed that 4 of the banks have less complex interface and confirmed working on the tool as easy task once anyone understand the basic business concept and new workflows introduced along with the tools. On the contrary, one of the respondents shared different view regarding the easiness of the system. While working with these tools especially the old version of the tools is very difficult to understand. This is because the tools are equipped with complicated interfaces in which end users find it very hard and gradually lose interest to work on these tools. Based on reviewed technology adoption and implementation literatures higher degree of usefulness assist the end users in having more positive attitude towards using a certain product and brings customers the sense of ease with positive attitude towards the product usefulness [23] [40]. Due to its high complex manner the bank has considered much time, cost and effort to fully understand and work with the tools.

5.1.4.3 Training

As discussed in above sections, the analytics tools are combined hardware/software architecture that gathers and process large volume of transactional data. Then these analysis results in meaningful transaction reports which are meaningful information for the banks. These meaningful information's and reports assist each bank decision makers to make better-informed business decisions. The benefit can be consolidated as a competitive advantage and increased profitability of the bank operations.

To use, implement, and fully exploit the advantage of any technology factors that facilitate its

implementation needs to be explored as a result this theme consolidates all other possible factors that facilitate the implementation of these tools based on the respondent's data. These factors are efficient training, support and recognition from top level managers and preparing sufficient business requirement document. Furthermore, any company with the plan of implementing these tools need to secure the access to all the relevant data, make these tools as part of every operation and ensure all employee can benefit from it.

Training: During and after implementing these tools the end users specially the business managers were feeling confused on the usage of the system specially switching from the old methods to the new ones was very challenging. Most of the users were comfortable and familiar with the old services therefore there were resistance in accepting and using the tools. To overcome this problem IT teams at all the sampled banks have streamline and give sufficient training to the end users specifically focusing on the advantage of the systems, how it eases their operation, how reliable the final result is and how it will assist their operation. Based on the result efficient training, motivation, support, and recognition from top-level managers and sufficient business requirement documents are the major identified factors as facilitating factors. Furthermore, the revised literatures suggest that a positive correlation between sufficient training and performance of task [22] [30] [65].

Summary

For successful development and to leverage all the potential benefit of the analytics tools, the existing challenges, barriers and the current status of the banks in implementing this tool is explored. This investigation is believed to facilitate the sectors in building more efficient and effective strategy in using the tools. Several studies that had been conducted abroad identify main factors that affect organizational adoption of data analytics. Similar with implementation of other technologies, the factors that affect the implementation of the tools might differ from one sector to others. For instance, Management Support, Organization size, Finances, ICT infrastructure, Scalability, Security, Competition, Customers, and vendors are the identified factors that affect the implementation of the tools [54]: recent study in china hypothesis that for organizational users to adopt big data analytics, they need to ready their technological, organizational, and environmental assets [26].

Another research on the usage of the tools identifies the behavioral intentions as a major factor towards the acceptance of the tools and the changes that come along with the implementation of the systems [35]. To effectively optimize these tools, human resources must be equipped with the necessary knowledge [36], complex problem solving [37], decision making [38] and exploring large volume of data to extract knowledge [6]. Another challenge includes funding needs, infrastructure, leadership and governance, security and interoperability, and socio-cultural and technological environments.

Other aspects such as lack of analytical and managerial talent necessary to make data-based decision as one of the challenges faced with implementing these tools [17]

Additional to the above factors some organizations confirmed their capability in technical infrastructure but fails to significantly gain the most advantage of the tools due to implementation of the tools that do not fit the organizations culture and structure [35].

However, this research paper has identified categories, namely facilitator factor, inhibitor factors and motivational factors that affect the implementation of the tools in sampled banks. For each category sub-themes are coded which are directly affecting the implementation of the tools and these tools are External factors, relative advantage, top level management, IT infrastructure, Human resource, Data management, Ease of use and customization.

CHAPTER SIX

CONCLUSION

This chapter discusses conclusions and contributions of this thesis, then, this chapter will be finalized with a recommendation and suggestion for further research.

Currently data is the driving force in every sector and its end users are now becoming aware of its benefit and the advantage of utilizing it because as highlighted earlier data by itself is not a tool unless it's used to get insight of what is happening around. Generally, this research paper is aimed at identifying factors that affect the implementation and adoption of data analytics tools through the case study of sampled financial institutions of Ethiopia. The research clarifies the theoretical perspective of data analytics and its application in the banking and financial sector. Finally, its advantages, current challenge, and facilitator factor for the implementation are explored. After the completion of these thesis the researcher has identified the main challenges as well as facilitator factors that are considered critical in the implementation of these tools.

The financial sectors currently are encountering unpredictable changes over the last couple of years. In order to compete and survive in the computational market each of the stakeholders considers answering questions of profitability, customer enquiry and handling and formulating strategic plan for highest potential revenue growth. To effectively answer and manage the market enquiry transactional data's that are generated in each second are seen as a valuable asset for the banking leaders which will enable them to navigate in this volatile environment. Therefore, for all the enquiries data analytics is becoming an answer. As highlighted in the previous section of the paper, this study focuses on exploring the factors that affect the implementation of data analytics tools in sample Ethiopian private banks. Thus, the researcher conducted an in-depth, semi-structured interview with five IT support officers whose work is directly related to working with these tools to answer the research question. Then from the interview answers themes were organized based on two categories: These themes are, facilitator factor and inhibitor factors and are presented under the facilitator and inhibitor factor of the tools. These themes are External

factors, relative advantage, top level management, IT infrastructure, Human resource, Data management, Ease of use and customization

First the application and usage of these tools in each of the sampled bank is discussed, the potential benefit of the tools and how they are being implemented is discussed. Based on the empirical finding of these paper, these tools are mainly used for descriptive analysis where by each bank use the analyzed transactional data to present their customer data at hand in the form of different consolidated reports. In terms of its usage all of the banks have confirmed that the tools are mainly used for top-level managers to make an efficient decision. As a result of these analyzed data, the banks are now able to make faster and fact- based decision making.

6.2 Strategy and recommendation

Due to the increased number of services and products in financial institutes, banking customers are now generating large volume of data on every business date. This data requires advanced processing and technique to be converted into valuable information. Therefore, to extract all the possible value out of these customer data analytics tools is now the most efficient way to filter through. These analyzed data is paramount to the realization of competitive advantage and for the achievement of wider market share. Several studies have revealed the possible application of these tools. The endless application of these tools is broadly categorized into: Security and fraud detection, Customer segmentation, risk management, branching strategy, efficiency and performance evaluation of their employee which can significantly assist in strategic planning and decision making. As discussed in previous sections, the potential benefit of using data analytics tools for business process is enormous and the banks are now using these tools to explore descriptive information of their customers data at hand. Based on the finding of this research most banks are not exploiting the full potential of the tools. The analyzed data from the tools is simply to signal what went wrong in terms of calculated numbers, percentages and graphical reports without explaining why, without prescribing best solutions or with our predicting the possible outcome. As a strategy to use the tools efficiently these recommendations need to be taken in to consideration for any sector planning to implement these tools:

- The banks implemented these powerful tools need to exploit the full functionalities. Specially in customer segmentation and marketing this tool can provide powerful usage.

One of the main advantages of implementing this tool is to assist in segmenting the customers into diverse groups. By clustering the customers based on their specific business objective to develop more accurate insights regarding customers preferences, customer-centricity and unique value propositions. The analytics should be part of every major initiatives.

- For the analysis solutions to effectively drive the decision making the IT infrastructure must be an early part of any planning that can support all of the current and future analytics needs. The IT infrastructure must be designed to enable new level of patterns, new end user requirement and insights to retrieve from the existing data. In addition, its features should be highly flexible and scalable and tuned for today big data environment. Based on the latest researches made, the more mature an IT infrastructure is, the easier it is for an organization to adapt to any new technology and to improve business performance.
- The other aspect is human resource and the perspective digital literacy regarding analytics tools. Before implementing these tools, organization needs to verify that they have the right people with relevant experience and skills. Companies must equip themselves with human resource that have necessary knowledge in this sector. To effectively work with these tools data visualization and machine learning skills are required from IT staffs to make an informed decision based on raw transactional data. Data analyst must be knowledgeable about the business and should be equipped with a great communication skill to share ideas on going forward in usage of these tools. Additionally, Top level managers must also take the responsibility for supporting the change and new technology implementation and showing commitment to ensure a successful adoption.

- Along with the above recommendation efficient training, motivation, support, and recognition from top-level managers and sufficient business requirement documents are the major identified factors as facilitating factors.

6.3 Main contribution:

The general aim of these research is to explore the factors that affect data analytics tools implementation at financial institutes of Ethiopia. As described earlier to take advantage of this

analytics tools, factors that facilitate as well as impede the adoption of these new technology needs to be well explored.

- These researches have described the trending factors that are affecting the implementation of data analytics tools.
- The research clarifies the theoretical perspective of data analytics and its application in the banking and financial sector.
- The role of the tools in the sampled financial sectors, current challenge and facilitator factor for the implementation is explored.
- This research explores the organizational perspective on the implementation of the technology in terms of human resource and IT infrastructure.
- Understanding the factors that can influence the utilization of the technology can assist the sectors to implement strategies and improve the update of the implementation process.
- The result of these research will provide an insight into the current status of the banks in implementing these tools therefore this might assist in future researches related with this topic.

6.4 Future work

This research paper is aimed at identifying the factors that influence the technology implementation of data analytics through a case study of financial institutions of Ethiopia. The research clarifies the theoretical perspective of data analytics and its application in the banking and financial sector exposing its various definition and characteristics. After contextualizing the concept of data analytics in financial institutions, its role, current challenge, and facilitator factor for the adoption will be explored by carrying out an empirical study among selected financial institutes. The main contribution of this research will then be revealed by gathering and uttering the elements that are prone to answer the research question.

This research explores the factors affecting the data analytics implementation in sample private banks of Ethiopia as a result the finding might not be applicable to other sectors. Since the data analytics concept is emerging, the topic needs to be studied to include other sectors too, that are known to produce huge amount of data so that the credibility of the discovered factors will be enhanced. In addition, other researches can also be done on enhancing the discovered factors via

adding other factors that affect the implementation of data analytics tool in order to make it more comprehensive in which it can also support other industries too.

Other researchers can do similar research using instruments and models developed in this research to make the proposed factors a theory for technology implementation and adoption. Other researchers can also test the factors with quantitative methodology. As new Findings from other researches will contribute to the generalizability of the research. Furthermore, since this research did not focus on the actual implementation of the variable, future research focusing on the practical implementation would also be beneficial. Finally, in addition to exploring the factors affecting the implementation of these tools developing recommendations to increase the acceptance would greatly contribute to the relevance and practical implication of scientific work.

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APPENDICES

Appendix A: Interview Guides and Purpose

1. Please will you outline your role in working towards the successful implementation of data analytics tool at your bank?
2. Could you please specify what kind of analytics tool is implemented in your bank? For what kind of analytical purpose does your company used it for? i.e Descriptive, predictive or prescriptive?

Facilitator factors

3. What are main benefits of analytics tool for your bank?
    i. What is the perceived significance of implementing the analytics tool for your bank at operational and top-level managers in decision making?
    ii. What is the valuable outcome of implementing the analytics tool for your bank customers?
    iii. Can u please describe the significance of implementing the technology for your bank in general
4. Does the bank has the chance to experiment the technology before fully committing to it?
5. What motivates your bank to implement these analytics tools?
6. Do you think the image or perceived gain in social status your bank experience by using new innovation influence your bank in adopting this technology?
7. Do you think TOP level executives of the bank were supporting in adoption and implementation of the tools? If not in what aspects do you perceive this as lack of support?
8. Was there a key individual who championed the adoption of the technology? if Yes why were this person so crucial? Would the technology have been adopted without them?
9. Were there any individuals who were resistant to the adoption of the technology? If yes why were they resistant? How was their co-operation secured?

10. Were there user acceptability issues in relation to the analytics tool? If yes what were these and how were these overcome?
11. Do you think the interaction between the bank employees and the analytics tool is clear and easily understandable?
    i. Do you think learning the tools for the first time was easy?
    ii. Do you think the employees are skilled enough to implement and maintain the technology?
    iii. Does your bank team have the necessary knowledge to use the analytics tool?
    iv. Do you think being skillful in the sector is easy?

Barrier factors

12. What do you think are the main organizational barriers to the adoption and implementation of the technology?
13. What were the biggest challenges your company has faced during the implementation process? How does your company deal with this/these challenges?
14. Do you think the bank has sufficient IT infrastructure to implement the technology?
15. What do you think are the main policy barriers to adoption and implementation of the tool?
16. Do you believe that implementing the analytics tool has its own security risk? If yes how is this risk perceived? How is this risk alleviated?
17. Do you think the analytics tool fits into the current organizational culture and management style of your company? If yes how?

Closing and recommendation

18. Do you believe that the difficulties experienced in adopting the technology is specific to this technology or would it be applied to other technology?
19. Do You think that best practice can be prescribed for the technology adoption? If yes can you indicate what form this would take?
20. Reflecting on the adoption and implementation process for implementing the tools, If your bank wants to undertake this process again what would your team do differently and why?

Table 4 : research question and interview question matric

Interview question	RQ1	RQ2
3	✓	
4	✓	
5	✓	
6	✓	
7	✓	
8	✓	
9		✓
10		✓
11		✓
12		✓
13		✓
14		✓
15		✓
16		✓
17		✓