

Customer Behaviour Analysis with AI Implementation at Banks Operating in Azerbaijan

FINAL PROJECT

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ABSTRACT

The technological disruption is redefining the industries and altering the way commercial establishments operate, and each are of business is evaluating selections and implementing ways in order to make value in the innovative world. Since we entered fourth industrial revolution,, machine-learning and artificial intelligence innovation are powering automation of business in progressively much more sectors, from scheming optimum transport loads to sifting loan applicants less of the human contribution. One of the foremost industries being impacted by these alterations is banking segment, which is experiencing revolutionary vicissitudes, the most imperative of them being the upsurge in customer centeredness. This research aims to examine the customer behaviour analysis with artificial intelligence implementation at the banks functioning in Azerbaijan. In doing so, this research explores the existing literature on the AI and banking sector, analyses the AI implementations of the banks operating in Azerbaijan, and studied the ways customers react to these implementations. This research utilizes the compounds of the theoretical and empirical research methods. As such, there will be survey-based primary research, which will aim at understanding and describing the approaches of the bank customers in Azerbaijan to the AI-powered applications and solutions of the banks. In addition to this, there will be structured interviews with the IT departments of large banks operating in Azerbaijan, with the aim of understanding which AI applications they currently utilize, and what are the benefits and challenges of implementing them.

Key words: Customer Behaviour, Customer Behaviour Analysis, Banking Sector, Artificial Intelligence, Machine Learning, Digital tools

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1. STATE OF THE ART

1.1 Background of the Customer Behaviour

Every sector of business is considering options and putting them into practice in order to generate value in the creative world since technology disruption is redefining sectors and changing how commercial establishments function (Kuanr, Arjun and Suprabha, 2021). Since the beginning of the fourth industrialization, advances in artificial intelligence and machine learning have pushed corporate automation in an increasing variety of areas, from designing the most effective transport loads to assessing loan applications (Schwab, 2016). (Canhoto and Clear, 2019). The banking sector is one of the ones most negatively affected by these events. The most significant of these changes is the growth in client centeredness (Königstorfer and Thalmann, 2020).

Conversational interfaces and instant conversion are just two examples of how AI technology is affecting our everyday life. This is especially true in the financial services industry, where innovators have already started developing innovative AI-based solutions (Canhoto and Clear, 2019). In order to stay competitive, incumbent banks must put "AI first" in their strategy and execution (Biswas, 2020). This calls for a complete capacity load change that affects engagement level, AI-driven decision making process, fundamental technology and information infrastructure, and operation paradigm (Huang et al., 2020). By supporting customers' financial activities across numerous online and physical frameworks with intelligent, highly tailored solutions offered via an inherent, smooth, and rapid interface, these capabilities have the potential to considerably improve engagement. The requirements for an AI bank are as follows (Chung, 2020).

While the use of machine learning (AI) in banking is expanding, it is also creating opportunities for more complex and profitable business solutions in other industries (Dirican, 2015). In the banking industry, AI is being employed more and more (Kaur et al., 2020). According to the World Economic Forum, the majority of firms have used AI solutions in fields including risk mitigation and generating income via innovative goods and techniques (2020). As the need for artificial intelligence rises, banks and other financial businesses are managing more complex difficulties with their current solutions (Li et al., 2021).

Artificial intelligence is unsettling the banking sector because it enables the utilization of more data of all types and sizes to provide better credit risk forecasts (Sadok et al., 2021). AI is particularly adept at managing "big data," which includes information from social media, digitized client contacts, and consumer behavior (Kaur et al., 2020). Big data enables credit score predictions to be based on a wider range of characteristics than are typically included in conventional statistical models (characteristically, payment history and revenue). This raises the issue of whether loans may be made accessible to people or businesses who were previously deemed unacceptable based on conventional statistical modeling utilizing traditional datasets if big data-centered AI-grounded forecasts are used (Chung et al., 2020).

In order to improve consumer experiences on mobile and online platforms, some financial institutions have recently made significant investments in digital (computer-based or electronic) and analytics developments (Huang et al., 2020). In spite of these substantial expenditures, most financial institutions continue to lag behind businesses that use consumer-focused technology in their quest to meet the needs of their customers for improved facilities and processes (Königstorfer & Thalmann, 2020). Lost signals afflict banks' current client acquisition and facility delivery strategies: Clients emit signals throughout their digital travels that incumbents are often unable to identify and comprehend. Contrarily, companies that are at the forefront of providing exceptional experiences across sectors make crucial trips simple to access and utilize while also personalizing them to a person's current context, way of moving, and wants (Ryzhkova et al., 2020). After becoming acclimated to the standards set by client internet firms, customers now want the same level of consistency, personalisation, and simplicity from their banking and financial institutions (Tiwari et al., 2021).

Customers who are used to utilizing modern technology in their daily lives want banks to provide smooth solutions (Carbo-Valverde et al., 2020). Financial institutions have expanded their sector scale to commerce and RD&IT in order to meet these expectations, and they now provide products like mobile payments, e-banking, and rapid money transfers (El-Gohary, 2021). These advances have led to new expenses for the banking industry in addition to giving customers access to the bulk of financial resources whenever and wherever they desire (Nitescu & Duna, 2018; Veerla, 2021). The usage of computerized systems for transferring critical data has increased in the banking industry, yet these systems are susceptible to breaches and dishonesty (Ortiz, Marin

& Gualdron, 2016). The use of AI is necessary to improve security and the customer experience since these incidents damage banks' ability to operate efficiently as well as their brand and client relationships (Unhelkar & Gonsalves, 2021).

Commercial banks may utilize AI to fulfill customer requests with related financial goods and accuracy marketing to improve the customer experience due to the wide diversity of financial products and client preferences (Ryzhkova et al., 2020). Contrary to the conventional wisdom, clients no longer actively seek out banks, and the emergence of non-bank financial organizations has resulted in an increase in financial service providers. Commercial banks must step up their efforts to attract clients by providing more reliable service (Ashta & Herrmann, 2021). Because of the expansion of financial knowledge, technology businesses have entered the lending sector, which has forced conventional banks to diversify their marketing strategies and spend more in marketing. In order to evaluate data and decrease data inadequacy and leakage, banks may utilize AI and other cutting-edge financial technology techniques (such as Machine Learning, Deep Learning, and others) (Thowfeek et al., 2020; Huang et al., 2020).

Commercial banks' main line of business is credit. Artificial intelligence (AI) technology has the potential to significantly improve the retail credit business model of commercial banks by lowering labor costs, efficiently managing risks, and increasing customer happiness (Fraisse & Laporte, 2022). Recurrent neural networks, for instance, may be used to distinguish crucial information in financial data. Large amounts of client data from individuals or small enterprises must be managed by commercial banks (Golubev et al., 2020). This method may improve operational productivity by precisely identifying crucial data. Auto-encoder competence may boost the usability and effectiveness of banking services while also ensuring the safety of loans and speeding up the process of identifying risks. Deep learning technology may be used to distribute credit, eliminate the need for human review of particular loan types, and increase the efficiency of resource allocation (Rodrigues et al., 2022).

Commercial banks might improve cost-control procedures using AI to increase organizational effectiveness (Moro et al., 2015). Primarily, the use of customer service robots and other technologies in particular services over various channels, including phone, online, and mobile banking, may be successful in reducing demand for fundamental positions, such as sales roles and customer service of the commercial bank, and gradually reduce labor costs (Rahman et

al., 2021). Additionally, the introduction of electronic signs, receipts, and other objects is made possible by the application of artificial intelligence in corporate processing processes (Chung et al., 2020). AI efficiently controls the expenses associated with running banks by lowering the reliance on paper-based products and assuring security. AI transforms the conventional credit authorisation business procedure, which also enhances customer satisfaction and boosts the efficiency of corporate management (Sadok et al., 2022). With the help of engines, machine learning (AI) has had a big influence on the banking industry as well. It uses data from client histories to provide the best client recommendations it can, based on prior behavior and preferences. Since the dawn of time, several banks have used recommendation engines to increase their profits (Donepudi, 2017).

1.2 Customer Behaviour Analysis Tool and Techniques

This section outlines the techniques or procedures, which are utilized for identifying and scrutinizing information about customer behaviour analysis towards implementation of Artificial Intelligence at commercial banks functioning in Azerbaijan.

There are numerous approaches to executing research, of which deductive, inductive and abductive approaches are fundamental approaches. Deductive research utilizes already developed theoretical outlines to investigate hypotheses within a context (Varpio et al., 2020). Inductive research, on the other hand, is used when there is no suitable theory to describe a phenomena and the unique research is used to contribute to theory creation (Azungah, 2018). Deductive reasoning has several benefits, including the ability to explain causal relationships between ideas and variables, compute concepts numerically, and take a comprehensive picture of study findings within a given range, to name a few (Pearse, 2019). Deductive and inductive studies serve different purposes in the advancement of understanding and lead to different conclusions; therefore, they should be selected based on the research's purpose (Lambert & Montemari, 2017). When following abductive research approach, the study procedure commences with remarkable facts or puzzles and the study course is dedicated to their clarification (Dubois & Gadde, 2002). These facts might arise when the researchers confront with an empirical phenomenon, which might not be clarified by the existing studies (Pearse, 2019). This study follows deductive research approach, for the

reason that there is a great pool of existing research on AI, its implementation on banks, and how it affects customers' behaviour in different countries.

There are two fundamental approaches for doing research: quantitative and qualitative methodologies, individually and in combination. Mathematical data, such as numbers and computations, are used in quantitative research and are analyzed using numerical and statistical techniques (Lo et al., 2020). Comparatively, qualitative research produces thorough data that completes a picture and is especially helpful for figuring out how and why certain events occurred (Lindgreen, 2021). Numerous data sets, the capacity to draw general conclusions about a certain community, and results that are indicative of a group are all benefits of quantitative research methodologies. In addition, the study's idea and techniques are documented and may be shared, and it can be repeated in the future using conventional approaches (Ahmad et al., 2019). However, these investigations could be laborious and need collecting data over long periods of time (Martin & Bridgmon, 2012). Additionally, the data may or may not provide light on why individuals behave or feel the way they do (Basias & Pollalis, 2018). Utilizing qualitative research methodologies and approaches has several advantages. The majority of the time, qualitative research creates a thorough image of participants' attitudes, routines, and interpretations of their behavior. As an interdisciplinary area, qualitative research, according to Lo et al. (2020), comprises a wide range of perspectives, inquiry methods, and explanatory procedures for comprehending activities. However, this kind of research might take a while, need several sessions, and be difficult to replicate the findings (Goertz & Mahoney, 2012). Contrarily, a mixed research uses both qualitative and quantitative data (Timans, Wouters & Heilbron., 2019). The fusion of both qualitative and quantitative inquiry approaches is used in this study. In order to comprehend and describe the approaches taken by bank customers in Azerbaijan to the AI-powered apps and solutions of the banks, primary research based on surveys will be conducted. In addition, organized interviews will be conducted with the IT departments of major banks doing business in Azerbaijan to learn more about the apps they presently use for AI and the advantages and disadvantages of using them.

Books, publications, and scholarly papers are used to obtain information on the theory and the present conceptual framework. The primary source of the original data used in this study was an online survey that was sent to the chosen research participants through email, the LinkedIn

online platform, and the survey itself. The study's target participants are literate Azerbaijanis between the ages of 21 and 65 who can tell the difference between traditional and internet banking services. The aim of data analysis in this survey study is to get a sufficient sample size that appropriately represents the entire population of attention (Ponto, 2015). Because it is sometimes impossible to aggregate data from all of the representatives, the replies of a subset or sample of the representatives are evaluated (Einola & Alvesson, 2021). The chance that the input from the chosen sample accurately represents the whole population increases with the size of the non-probability sample. People with traits comparable to the group must be included in the chosen sample in order to properly complete the results about the population (Espejo, 2014). The sampling method used in this study may be categorized as non-probability sampling since samples from the population are chosen based on the researcher's subjective assessment (Schutt, 2015).

In this study, an online application was used in lieu of Google Forms to collect, assemble, and display data. Researchers may utilize the internet tool Google Forms to collect information using web forms and enter the results in a Google Sheet. This platform's key advantage is that it makes it simple for huge populations to give data, which the researchers can then compile in one location. The data may then be reviewed. No matter how many people replied to the survey, Google makes sure that all of the information is always gathered and put into one neat layout (Raju & Harinarayana, 2016). The Google Form survey link was sent over the LinkedIn network to anyone who want to participate in the survey study. The results of the survey were converted to an Excel file, which was then evaluated to summarize the general condition.

Along with the data from survey, there will be structured interviews with the IT departments of five large banks operating in Azerbaijan, with the aim of understanding which AI applications they currently utilize, and what are the benefits and challenges of implementing them. Additionally, the IT experts of those banks will be asked about the form of customer behaviour analysis they utilize and whether they are AI-centric or not.

2. LITERATURE REVIEW AND RESEARCH METHODOLOGY

2.1 Literature review

The analysis of consumer behavior is one of the main issues that attract the attention of many scientists from different region of the world, and currently it is possible to discover many scientific works and research works in this field. Examples of these scientists include Ainslie, Foxall, Hantula and Fagerstrøm.

For Ainslie business performance should take into account the consequences that its goods and services possess on clients, which may be done when consumer behaviour metrics guide marketing tactics. In addition, customer behaviour scrutiny - an area of study, which combines operant behavioural economics and marketing, has established numerous dealings of customer purchasing outlines grounded on the recognitions of the categories of fortification, informational or functional, which is planned thru diverse goods and brands, and of the extent of customer behaviour setting for Foxall.

Foxall have revealed customers possess brand ranges, which comprise brands proposing analogous extents of fortification, that they are inclined to alter the size they purchase packaging size, fee promotions, and utilitarian and informational fortification as a function, which customer specific alterations have a tendency to endure rather unchanging through time, and that increasingly exposed settings upsurge the length of search for goods, lessen the indispensable worth of brands and enhance customers' reports regarding supremacy of shopping settings and approach rejoinders. Furthermore Foxall pointed out that these methods of customer behaviour could be unified with ways of company behaviour for assessing corporate performance, grounded on an operant explanation of company behaviour.

For both Hantula and Foxall customer behaviour analysis has pursued to blend behavioural psychology, behavioural economics, and marketing field into a cohesive body, which realizes consumer behaviour in a distinctive means. Customer behavior examination is a intermingling of behavioral economics with the actual difficulties of customer selection in a marketing-concentrated economy. Grounded on the merging of operant behavior concept and investigational economics, behavioral economics has established great gains in explaining decision behavior with

regard to its environmental implications. Majority of the previous study used nonhuman participants, however there is currently a deep-rooted body of study outcomes on human decision in economic contexts. Some authors like Wells expand customer behavior analysis through merging it with marketing knowledge, the empirical research of customer decision forms in prosperous, marketing-positioned nations.

A matching analysis was used in several projects to investigate customer brand and good preferences. For example Foxall and Wells used the panel data and Sigurdsson applied in-store investigation and Fagerstrøm preferred online. Moreover, this has discovered the philosophical foundation of customer behaviour analysis and spoken behaviour of customers by Foxall in addition to the evolutionary grounds of customer strengthening by Nicholson and Xiao. Yani-de-Soriano and Foxall have investigated consumers' emotional reactions to consumption surroundings in customer behaviour analysis as well.

For MacInnis and Folkes customer behaviour investigation is also useful for marketers in identifying how to encourage their offerings in the most influence way. Accepting customer behaviour is the foremost covert to attaining and connecting with the consumers and persuading them to get from the business. With the utilization of social listening, customer behaviour analysis collects both structured and unstructured information, amassing it and segmenting it aimed at swift scrutiny by commercial establishments. It is imperative to comprehend that this insight is necessary for each section of the business procedures, ranging from marketing to research and development (R&D), customer relations, finance, and planned decision-making must stream by this insight.

Karczewska investigated all psychological drivers of customer behaviour like intentions, attitude perception, understanding, practices and customs, personality, risk tolerance, and lifestyle. Price, items, revenue, sale location, and marketing are all economic factors of customer behaviour. The societal alliance, a family, and a reference group are examples of societal and cultural drivers of customer behaviour. These contributing factors are outside influences that influence customer purchasing behaviour. Inner variables include individual and demographic influences for instance gender, education, family life phase, and lifestyle.

Makarewicz further explored the role of globalization in consumer behaviour. For him in the era of globalisation the assortment of consumer attitude factors, which is sensitive to ethnic group, religious affiliation and cultural issues to be the fundamental and essential concern. For a few years, novel trends in customer behaviour and the evolution of novel customer groupings have been seen. Customers are prioritised in a market economy, and clienteles benefit from this. Customers have the potential to pick from a different competing options, impacting the different kind of things and services on sale, price, promotional actions, logistics in good allocation, and setting marketing combination. There are different characterizations of customer behaviour in the existing theory. But for Malter this is essentially a series of behaviours targeted at acquiring, utilising, and handling items and services, along with choices made prior to the acquisition.

As a result of a detailed analysis of Rudnikin's scientific works, it is revealed that the customer acts logically if he or she spends accessible funds on things that will provide the most enjoyment. Irrational customer behaviour is defined thru the customer's incomprehensible conduct, in which they deliberately make purchasing choices, which might not be in their top interest areas. Unreasonable purchasing decisions are forced by the desire of impersonation, winnings, pretentiousness, and insensible inspiration instead of cold logic. The customer is frequently uninformed of these dependences.

Sundareswaran, Roma and Hursh investigated marketing campaign which focused on increasing client enthusiasm. This denotes to items related to customers' interests, as well as those whose acquisition is highly driven. Outside motivation, in contrast, might be modified through the marketplace. Presuming that a consumer's essential aim is to obtain a reward or draw awareness, rivals might be able to gain the client through successful marketing. For Sundareswaran, the other component of customer conduct that must be considered when planning a marketing campaign is the distinction between logical and emotive enthusiasm. In case an advertising wants to focus on logical motivations, it must demonstrate the merits of the good or the financial elements of an acquisition. Nevertheless, if an advertising uses the emotive component, it is to elicit a favourable manner in relation to the marketed goods.

For Wells (2014) several things has a big affect on customer behaviour, as in keeping with the most important determinants influencing customer behaviour are: economic sitation, marketing advertisement, personal preferences, purchasing power and group affect.

Ainslie (2016) assumed that purchasing behaviour are not same with purchasing habits. However patterns illustrate a predictable psychological behaviour, habits are improved as tendencies on the way to activity and over time they turn natural behaviour which is existing from the beginning of the time. While purchasing behaviour patterns are bombinated and provide marketers a individual characterization, each consumer is unique for his purchasing habits. Consistent with customer behaviour patterns might be classified into place of buying, items acquired, duration, frequency and method of purchase.

Theoretical literature and papers written in the second part of the twentieth century employ a 3-staged model, where consumer behaviour was supposed to be described through line model of an data analyse processing. For Solomon, the behaviour refers to a customer's activities in relation to an attitude object.

Nicosia point out that consumer attitude, enthusiasm, purchasing behaviour, and knowledge are the outcomes of consistent key fields, and these outcomes have a substantial impact on the following sections. According to the data analyse processing technique, clients initially combine data, before deciding on purchasing, they acknowledge and evaluate them. Nevertheless, in the twenty-first century, this pattern is seen to be overly generic and ambiguous, making it almost hard to employ and utilize it for particular marketing choices concerning message positioning and content. As a result, various models have been constructed to characterise purchasing behaviour thoroughly.

In 1968 Engel-BlackwellMiniard was introduced by Engel which analysis of customer behaviour. The Engel-BlackwellMiniard model depicts the phases of decision-making that are influenced thru personal qualities (for instance reasons and principles), societal factors (for instance culture), and situational impacts.

The another studies on consumer behaviour is Stimulus-reaction model which established by Kotler in 2012. In this model there are two effective variables which has a big influence on

customer behaviour. They are outside and inner elements. Economic, technological, political and cultural issues belong to outside setting issues. On the other hand, marketing stimuli such as product, price, placement, communication also belong to outside setting issues. In addition, in this studies Kotler gives us explanation of classic five stage customer buying decision process. These process is consist of issues recongnition, data search, asses of different options, acquirement decision and post purchase patterns elements.

In 2015 Kotler further developed his theory with Amsterdam and created an Armstrong & Kotler model. This model of customer behaviour depicts how external cues go into the customer's black box to elicit a reaction, namely, a buying choice. For Solomon every customer doesn't follow all of these phase during purchasing process.

According to the majority of theories, the consumer decision-making procedure is divided into three phases: cognitive, emotional, and behavioural. For the duration of the cognitive stage, the client's psychological progressions are impacted, as a result, product perception is developed. During the affective phase, the customer connects with his/her emotive or feeling reactions and forms a variety of connections and viewpoints about the merchandise. According to De Pelsmacker the consumer is led to a certain act(s) during the behavioural phase, that is usually a purchase activity.

The majority of the hitherto stated models presume that the client passes over reasoning, emotional, and behavioural stages in that order. Nevertheless, there are many debates about this structure, and various experts have proposed other alternatives. Author Vaughn proposes four distinct sequencing models in his Foot - Cone - Belding (FCB) grid model.

There are different types of banking services model from traditional to digitalized and different researchers defined contrasting characterization of these types of models.

For Roengpitya banking services models is divided in three basic model based on their funding types: wholesale funded, retail funded, commercial bank and public offering bank.

European Banking Authority defined four essential drivers have a big effect on the traditional banking models such as difference in customer behaviours, difference in the income

level, heating competition and reforms in the normative base. For them digitalization in financing services gives a new opportunity for both for consumers and bank entrepreneurs.

In addition, digitalization is another aspect which always attracts researchers' attention. Gasser, Japparova, Apoga touch the digitization of financial services in their research work.

Sardana & Singhania investigate new banking sectors services related to new innovative novels such as Automated Teller Machines (ATMs), mobile banking, house banking, plastic cards and so on. In his research he gives a clear definition each of mentioned banking sector services.

To identify costumer's need in advance many researchers investigated customer behaviour at banking sector. Vazifedoost, Ansar, Yekezare, Devlin, Storbacka and others pointed out some interesting side of the customer behaviours with investigating customer habits, the process which consumers involve in during their banking journey and external factors that have a big influence on their choice. Even Vasiljeva, Kreituss, Kreituss give an information about some patterns which every commercial banks follow to attract more consumer and to meet their need in advance. For Accenture, an omnichannel experience is expected by more banking consumers. Increasing number of customers expect from their banks self-service options, It is a fact that, self-service activities increased by 69 % from the year 2020 to the year 2021.

For investigating the implementation of artificial intelligence (AI) driven technologies in the commercial banks some researchers' articles and studies have been taken in accounted such as Tzeremes, Zopounidis, Chen, Boussemart, Afsharian, Athey, Imbens, Jordan, Mitchell. all of them emphasized the significance of artificial intelligence (AI) in the banking and other financial fields in their works. For Doumpos Artificial intelligence driven technologies make it available to manage complex information in different data type such as video, image, sound and written data.

In addition, Fethi & Pasiouras (2010) figure out the role of artificial intelligence in bank breakdown prediction, assessing bank performance and credit rating. In their investigation they collect and analyse a small group of researches that use simple robotics methods.

Moreover, Kaur and Vijai pointed out new innovations are being used in banking sectors such as expert system and machine learning systems. For them automation of these process are more cost and time effective. Additionally, researchers is accustomed understand customers more

with offering them unique products and services based on their preference. In contrast, Königstorfer & Thalmann highlight the role of artificial intelligence (AI) in decreasing lending-related waste. Also banks and financial institutions can hire prognostic data analytics, refer to statistical models such as regression model, exponential smoothing and robotic methods to prognose economic losses and financial crisis. Great Economic Recession of 2008 is one of the examples of them. Ghandor also introduced opportunities to implement “faceless” AI systems at banking sectors and how it affects consumer behaviours of youngsters. Cybersecurity and privacy protection was another aspect of implementing AI-driven technologies to banking sectors which was taken into account by Boobier in his works.

Theuri and Olukuru investigated the using of client data to increase income. From their point of view, bank sector may exploit client data in a different division like product improvement, marketing, talent management, and client support to make a decision.

For Payne Artificial Intelligence-driven Customer Behaviour Analytics is a novel creation of customer intelligence solutions that employ a variety of model behaviours. It offers firms with information about client behaviour and advancement, enabling them to create knowledge and client managing expertise on an information basis. Furthermore, applications of AI enable commercial banks to always stay one step onward of client demand and in close proximity to the organization's sensitivity, revenue, compliance, and additional risk circumstances.

According to El-Gohary, AI-grounded applications help banks to measure customer churn estimation and make a decision for enhancing and improving bank products and services. In addition, Xu et al. pointed out keyhole as a solution to make a consumer reports basis on KPIs in his academic work.

In his work, Streeter clarifies a number of specific features of the Erica application, which has been in use in the banking sector since 2018. Baumgärtner mostly talks about the hybrid system that banks often resort to in his works.

In order to investigate the application of artificial intelligence and machine learning in Azerbaijan, the official reports of Central Bank and Talibov's research work in 2020 were analyzed in detail. For him, the best action took place about implementation of Artificial intelligence driven

technology to bank sector in Azerbaijan was electron wallet and PSPs in credit collection in distant places.

2.2 Problem statement and Significance of the Study

The area of information technologies in banking sector has progressed, integrating miscellaneous theoretic opinions. As such, information strategy alignment evidenced being vital for banking and other financial sector, and empirical studies have highlighted their role in advanced marketplaces (Reynolds and Yetton, 2015). The extent of advanced IT models after that were addressed in marketing, business process reengineering or information systems viewpoints in the banking sector (Davies et al., 1995; Min et al., 1996). The information technologies, namely AI and Machine Learning possess a moderating impact amid structural variables and effectiveness, strategic consequences, and innovation (Donepudi, 2017). Bose (2002) studied aspects of the connexion amid the clients and the organization, concluding the IT-powered necessities for the organizational achievement. In line with the technology acceptance model framework, the risk harmfully influences behavioural aim for online banking, as studied by Kesharwani and Bisht (2012). In addition to this, postponement in task completing, lack of time to acquire novel information, shortage of cross-sectional training, reliance on telecom operators, the extensive workload of bank employees and the tentativeness to hire more employees are most momentous aspects that deter bank-IT arrangement (Gbangou and Rusu, 2016). Hence, in recent works (El-Gohary, 2021; Nobanee et al., 2021), the authors have increasingly highlighted the significance of employing AI solutions with the aim of enhancing banking customer experience and bank-AI arrangement.

In the finance area, AI is reconditioning the processes aimed at managing finance (Medicine, 2021). The AI applications are supporting the fiscal assiduousness to revolutionize and augment developments covering from loan verdicts to a computable transaction and commercial risk management (Königstorfer & Thalmann, 2020). Customary banking has been altered in the financial facilities over gradually attributable to the prodigious innovations relating to the way businesses operate (Kshetri, 2021). The financial services assiduousness possesses a history of expending quantifiable methods and a set of guidelines for backing assessment, which create the

foundation of AI coordination, placing it at the top of implementing and endorsing AI knowledge (Castelli et al., 2016). AI is able to advance the excellence of products and services for customers attributable to the comprehensive and profounder analytical foundation and data (Kaur et al., 2020). It is capable of resulting in advanced effectiveness and lower outlays, predominantly in the field of compliance and fraud detection or anti-money laundering procedures (Dirican, 2015; Ortiz, Marin & Gualdrón, 2016). In addition, the government organizations as the financial marketplace or tax authorities can take advantage from AI-powered tools in that sense (Königstorfer & Thalmann, 2020; Kshetri, 2021). Moreover, AI can become a fundamental innovation power, altering financial service deliverers into data- and AI-grounded establishments (Unhelkar & Gonsalves, 2021; Li et al., 2021).

Although being a highly significant topic in today's world, the implementation of AI and the behaviors of customers are not fully analyzed, especially in the instance of small countries as Azerbaijan. At present, there are 27 banks operating in Azerbaijan, one of them being the Central Bank of Azerbaijan and the remaining 26 of them being commercial banks, 1 of them is owned by the state, and the rest are privately owned (CBAR, 2022). Consistent with the Central Bank of Azerbaijan (2022), overall, banks operating in Azerbaijan completed the year 2021 with the net profit of AZN 609 million. The banking sector of Azerbaijan has entered into a novel lucrative and performance-oriented era (Yagubov, 2021), which necessitates the application of sophisticated digital tools aimed at improving customer experiences (Abbasbeyli et al., 2020; Veliyeva, 2021). Nevertheless, there is not a study devoted to understanding the utilization of the AI- and ML-driven technologies at the banking sector of Azerbaijan, and how the application influences the customers' behaviour. Therefore, this research is projected to fill the mentioned gap in the existing literature, through exploring the existing literature and carrying out the original research.

2.3 Research Objectives and Questions

The aim of this research is to examine the customer behaviour analysis with artificial intelligence implementation at the banks functioning in Azerbaijan. In doing so, this research targets to explore the existing literature on the AI and banking sector, analyse the AI

implementations of the banks operating in Azerbaijan, and study the ways customers react to these implementations. Therefore, the identified questions for researches are as follows:

1. What are the benefits of employing Artificial Intelligence applications on modern bank operations?
2. Which AI tools are currently being utilized by the banks operating in Azerbaijan?
3. In what ways Azerbaijani customers react to digital and AI-powered solutions of banks?
4. Are Azerbaijani customers aware and keen on the past implementations of AI for bank services?

In addition, the predetermined hypothesis for researches are as follows:

1. The average age of people who using the bank service is 36 years.
2. The average monthly salary of people who using the banking service is 1890 USD.
3. Consumers' age and income have a major impact on consumers' choices to use online banking services.

2.4 Available models

Business performance should take into account the consequences that its goods and services possess on clients, which may be done when consumer behaviour metrics guide marketing tactics (Ainslie, 2016). Customer behaviour scrutiny - an area of study, which combines operant behavioural economics and marketing, has established numerous dealings of customer purchasing outlines grounded on the identification of the categories of fortification, informational or utilitarian, which are planned thru diverse goods and brands, and of the extent of customer behaviour setting (Foxall, 2010). The current publication covers study, which used several of these metrics and the key findings that came from it. This kind of works have revealed, for example, that customers possess brand ranges, which comprise brands proposing analogous extents of fortification, that they are inclined to alter the size they purchase as a function of packaging size, fee promotions, and utilitarian and informational fortification, which customer specific alterations have a tendency to endure rather unchanging through time, and that increasingly exposed settings upsurge the length of search for goods, lessen the indispensable worth of brands and enhance

customers' reports regarding supremacy of shopping settings and approach rejoinders (Foxall, 2016). Furthermore, these methods of customer behaviour could be unified with ways of company behaviour for assessing corporate performance, grounded on an operant explanation of company behaviour (Foxall et al., 2021).

By its foundation, customer behaviour analysis has pursued to blend behavioural psychology, behavioural economics, and marketing field into a cohesive body, which realizes consumer behaviour in a distinctive means (Hantula et al., 2001; Foxall, 2011). Customer behavior examination is a intermingling of behavioral economics with the actual difficulties of customer selection in a marketing-concentrated economy (Foxall, 2001). Grounded on the merging of operant behavior concept and investigational economics, behavioral economics has established great gains in explaining.

Decision behaviour with regard to its environmental implications. Majority of the previous study used nonhuman participants, however there is currently a deep-rooted body of study outcomes on human decision in economic contexts. Some authors expand customer behavior analysis through merging it with marketing knowledge, the empirical research of customer decision forms in prosperous, marketing-positioned nations (Wells & Foxall, 2011).

The study of customers and the practices they utilize for picking, consuming, and disposing of items and facilities, comprising emotive, psychological, and behavioural reactions, is known as customer behaviour. At the turn of the century, an introductory article laid the groundwork for customer behavior assessment (Foxall, 2001) and the previous examination was thoroughly examined in the three editions of customer behavior analysis: Critical views in business and management (Foxall, 2001). Customer behavior assessment arose as a result of the cognitive dominance of customer behavior study and the necessity to investigate alternate theories of customer decision (Foxall, 2010). Synchronized with the progress of customer behaviour analysis, the centre of behaviour examination was evolving and breaking novel ground in the implementation of behavioural concepts and models to the empirical comprehension of a varied extent of psychological phenomena as well, in what Roche (1999) referred to as a "novel wave" of behaviour psychology. While behaviour theories are important for the academic and experimental study agenda of customer behaviour assessment, philosophical and practical effects

extend further than the theoretical subjects identified as “experimental assessment of behavior” or “behavior analysis” (Foxall, 2001).

The “3-term contingency” or fundamental model of behaviour analysis:

$$S^D \rightarrow R \rightarrow S^R$$

where the foundation for the behavioral perception model is delivered through the signal or “discriminative stimulus”, “response” and the reward or “supporting stimulus”, making part of the work of customer behaviour analysis. The behavioral perception model is an explanatory mechanism, which originates from the mixture of customer behaviour setting extent, customer behaviour and its outcomes (which are utilitarian, information and aversive) as implied through the incentives, which encompass the setting (Wells & Foxall, 2011).

As evidenced by the author associations that comprise commercial institutions, psychology divisions, and technological schools, customer behaviour analysis is an utterly multidisciplinary approach to customer preference. Customer behavior assessment marks a variety of opinions as well. This is not, and was not intended to be, an endeavour to argue the primacy of behavioural psychology over logical or further viewpoints on customer preference. According to Foxall (2001), a major element of the concept is the utilization of opposing contemporaneous concepts of behaviour as viewpoints from which to evaluate one another.

On a continuum of goods ranging from pure services to pure physical commodities, customer behaviour analysis study has evolved from the pure products end of the continuum, yet much of its effort on branding has also produced consequences for customer services. A matching analysis was used in several projects to investigate customer brand and good preferences (Foxall et al., 2006; Romero et al., 2006), through the panel data (Foxall et al., 2010; Wells et al., 2010) and in-store investigation (Sigurdsson et al., 2009) and online (Fagerström et al., 2011). Moreover, this has discovered the philosophical foundation of customer behaviour analysis and spoken behaviour of customers (Foxall, 2009) in addition to the evolutionary grounds of customer strengthening (Nicholson & Xiao, 2010). Several research in customer behaviour analysis have investigated consumers' emotional reactions to consumption surroundings as well (Yani-de-Soriano & Foxall, 2006).

Perusing customer behaviour is essential for the reason that it supports commercial establishments to realize what impacts customers' purchasing judgments (Foxall, 2016). Comprehending in what way customers choose a good allows them to seal a marketplace gap and determine which items are required and which are outmoded. Furthermore, customer behaviour research also assists marketers in determining how to promote their offerings in a way that has the most influence on customers. Understanding customer behaviour is the foremost covert to attaining and connecting with the customers and persuading them to get from the business. By the utilization of social listening, customer behaviour analysis collects both structured and unstructured information, amassing it and segmenting it aimed at swift scrutiny by commercial establishments. It is imperative to comprehend that this insight is necessary for each section of the business procedures, ranging from marketing to research and development (R&D), customer relations, finance, and planned decision-making must stream by this insight (MacInnis & Folkes, 2010).

The effective customer behaviour analysis must expose:

- What the clients think and how they feel about numerous substitutes (brands, goods, and so forth);
- What impacts the clients to select amid a variety of choices;
- Customers' behaviour when searching and obtaining;
- How customers' environment (close people, media, and etcetera) impacts their behaviour (Hursh & Roma, 2016).

A company must understand the societal and cultural drivers of customer behaviour with the aim of designing a marketplace communication strategy. Clients' acceptance of beliefs and behaviour is influenced by their membership in a specific culture or subculture. These elements are crucial in developing the notion of interaction. Various aspects frequently impact customer behaviour. The businesses must research customer purchasing habits and buying trends. Consumer behaviour is influenced by three types of aspects:

- Individual aspects: a person's interests and attitudes might be impacted through demographics (i.e., gender, culture, and so forth).
- Psychological aspects: an person's reaction to a marketing communication will rely on their insights and mindsets.

- Societal aspects: family and friends, education level, social media - each impact customers' behaviour (Peighambari et al., 2016).

Intentions, attitude perception, understanding, practices and customs, personality, risk tolerance, and lifestyle are all psychological drivers of customer behaviour. Price, items, revenue, sale location, and marketing are all economic factors of customer behaviour. The societal alliance, a family, and a reference group are examples of societal and cultural drivers of customer behaviour. These contributing factors are outside influences that influence customer purchasing behaviour. Inner variables include individual and demographic influences for instance gender, education, family life phase, and lifestyle (Karczewska, 2010).

The assortment of customer behaviour factors, that are sensitive to ethnic group, cultural and religious affiliation, appears to be the fundamental concern in the era of globalisation. For a few years, novel trends in customer behaviour and the formation of novel customer groupings have been seen. Customers are prioritised in a market economy, and clients benefit from this. Customers have the ability to pick from a variety of competing options, impacting the variety of items and services on sale, price, promotional actions, logistics in good allocation, and setting marketing combination (Makarewicz, 2013).

There are different characterizations of customer behaviour in the existing theory. This is essentially a series of behaviours targeted at acquiring, utilising, and handling items and services, along with choices made prior to the acquisition (Malter et al., 2020). They comprise buying, owning, and utilizing items. Customer behaviour is demonstrated through the purchase of goods and services to meet demands. The action of purchasing is a complicated procedure that is led through the action of selecting, that possesses its own set of rules. Economic factors, supported thru psychological aspects, are significant since the value of a good / service is in comparison with the client's finances. The purchaser's purpose is to progress to the predicted ambition stage, as evidenced by the wants that must be met via acquired things. Customer behaviour may be described by describing the customer's inner rejoinders to numerous inducements and their particular viewpoint, because this kind of events elicit diverse behaviours in the course of the purchasing procedure (Karczewska, 2010). As a result, this behaviour is classified as reasonable or unreasonable. The former is defined as internally consistent behaviour that results in maximal

gratification. The customer acts logically if he or she spends accessible funds on things that will provide the most enjoyment. Irrational customer behaviour is defined through the customer's incomprehensible conduct, in which they deliberately make purchasing choices, which might not be in their top interests. Irrational purchasing decisions are driven by the desire for impersonation, rewards, pretentiousness, and unconscious inspiration instead of cold logic. The customer is frequently uninformed of these dependences (Rudnicki, 2004).

There exist four primary categories of customer behaviour in keeping with Makarewicz (2013):

1. Complex purchasing behaviour: This sort of behaviour is observed while buyers purchase a costly, seldom purchased goods. They are heavily interested in the purchasing procedure and customers' research prior to making a large commitment. Consider purchasing a home or a car as examples of sophisticated purchasing conduct.

2. Dissonance-decreasing purchasing behaviour: The customer is heavily engaged in the purchasing procedure yet has difficulty distinguishing amid brands. "Dissonance" might emerge when a customer is concerned that they would be disappointed with their decision. Consider purchasing a lawnmower: a customer will select one grounded on price and suitability, but once the customer have made the buying, they will seek assurance that they have made the correct decision.

3. Habitual purchasing behaviour: Habitual acquisitions are distinguished by the customer's lack of interest in the good or brand classification. Consider going grocery spending: the customer goes to the supermarket and purchases his / her favourite sort of bread. The customer is displaying a persistent pattern rather than robust brand devotion.

4. Diversity pursuing behaviour: In this case, a customer gets a distinct good not because they are dissatisfied with the prior one, but for the reason that they want to try something new.

Prior to creating an advertising for a certain good, it is vital to gather information on buyers' motivations for purchasing the goods (Sundareswaran et al., 2022). This essential understanding of customer behaviour gives direction on what tactics must be utilised to convince people to acquire a certain good. The nature of enthusiasm demonstrates its vulnerability to creation through

contemporary businesses. If a customer is inwardly driven via the satisfaction he or she obtains, changing this type of inspiration is tough. In this kind of a circumstance, the business's goal is to create a proper marketing campaign focused on increasing client enthusiasm. This denotes to items related to customers' interests, as well as those whose acquisition is highly driven. Outside motivation, in contrast, might be modified through the marketplace. Presuming that a customer's primary goal is to obtain a reward or draw awareness, rivals might be able to gain the client through successful marketing (Roma & Hursh, 2016). The other component of customer conduct that must be considered when planning a marketing campaign is the distinction between logical and emotive enthusiasm. In case an advertising wants to focus on logical motivations, it must demonstrate the merits of the good or the financial elements of an acquisition. Nevertheless, if an advertising uses the emotive component, it is to elicit a favourable manner in relation to the marketed goods (Sundareswaran et al., 2022).

There are several things have a big effect on customer behaviour, for Wells (2014) the most essential factors are following:

1. Marketing strategy: Marketing strategy which implemented by banks impacts purchasing options in a large-scale. However, with the right marketing communication, they can indeed convert consumers to change brands or conclude for more precious druthers, if done right and regularly. Marketing strategies, such as Facebook ads for online sales, could still be used as notifications for brands which need to be bought on some kind of regular basis but are not always at the top of customers' minds (for example insurance). A strong marketing message advertisement can impact frequency of purchases.

2. Economic circumstances: Economic conditions are especially important for expensive products (such as houses or automobiles). A sustainable economic environment is known to boost consumer confidence and willingness to make purchases regardless of their financial obligations. For more expensive purchases, the consumer's decision-making process is longer and can be influenced by more personal factors at the same time.

3. Personal opinions: Personal factors such as prefers, dislikes, preferences, morals, and principles can all influence a consumer's choices. Personal views are especially influential in

industries such as fashion and food. Furthermore, promotions can affect perceptions, but consumers' options are strongly affected by their preferences.

4. Group impact: Social comparison also has an influence on customer. What our members of the family, schoolmates, close relatives, neighbors, and friends of friends think or do that will influence our choices. Consumer behavior is influenced by social psychology. Selecting processed food over home-cooked breakfasts is just one example of this. Education and social factors can both have an impact.

5. Purchasing power: Finally, our spending power has a significant impact on how we act. The product may be excellent, and the marketing may be spot on, but if consumers do not have the necessary funds to purchase the specific piece, they will not buy it. Consumer segmentation based on spending power assists commercial establishments in determining eligible consumers and achieving better results (Wells, 2014).

It should be noted that this behavior is influenced by the circumstances that regulate the consumer purchasing process (Peighambari et al., 2016). As previously stated, purchase intention is influenced by a variety of factors (including institutional, cultural, and social environments), but it is also influenced by unintentional factors (Foxall, Oliveira-Castro and Porto Rafael, 2021). The number of possible causes makes purchasing decisions difficult to predict. However, all factors of behavior accumulate in a large amount of cases, becoming frequent indicators. Customer requirements, which are exterior indicators, influence consumer habits. Even though some requirements are taking precedence and act as a starting point for categorizing them, this reality does not encourage the significance of needs or provide recommendations for which requirements should be met first. Using the facts available above, Abraham Maslow, an American psychologist, established the hierarchy of requirements. Based on this theory, pleasurable necessity at a lower level within the hierarchy that is also more essential is required in order for another, less significant, really have to emerge at a superior level (Karczewska, 2010).

Patterns of customer choices

Purchasing patterns are not the same as purchasing habits (Ainslie, 2016). Patterns show a predictable mental design, whereas behaviours develop as tendencies towards the initiative and

become dynamic over period. Each customer has distinct purchasing habits, whereas purchasing behavior patterns are collective and provide marketers with a distinct characterization. According to Viksne et al. (2016), consumer purchase patterns can be classified as follows:

1. Purchase location: Even if all items can be found in a single store, most clients will split their purchases across multiple stores. Whenever a client has the capacity and connect directly to decide to buy the same brands in multiple stores, they are also not completely faithful to any store, unless it is the only store to which they have access. Marketers will be able to identify key store locations by studying customer behaviour in terms of location selection.

2. Purchased items: Analysing a shopping cart can provide entrepreneurs with valuable consumer understandings into the items purchased and the amount for every item was bought. Items of necessity can be purchased in bulk, whereas luxuries are much more likely to be bought infrequently and in tiny amounts. The volume of every individual item is influenced by the item's intermittency, the buyer's spending power, the unit of purchase, the cost, the number of purchasers who the item is designed, and so on.

3. Purchase frequency and timing: Consumers will shop when it is convenient for them and expect customer support even at odd hours, especially in the age of e-commerce in which all they need is a few mouse clicks. The shop's obligation is to meet these requirements by recognizing a shopping behavior and matching its service to the timing and frequency of shopping. Take into consideration that significant fluctuations and geographic factors must also be considered.

4. Purchase method: A consumer could also go to a store and purchase something there and then, or purchase make payments by credit card or even on arrival. The technique of buying could also induce more expenditure from the consumer (for internet purchases, the purchaser may additionally be charged a shipping costs for instance). The manner in which a customer purchases an item reveals a great deal about the type of consumer he is. Collecting information regarding their purchasing habits enables the business to discover new ways to entice consumers to purchase more frequently and at higher prices. The purchase patterns are hidden in algorithms, and the company can either look for them mechanically or combine a tool with their ecommerce to get electronic perspectives about behavior patterns (Viksne et al., 2016).

A customer's behavior in regards to an individual's attitude is referred to as behavior (Solomon, 2006). Customer behaviour is the field of the ways people, communities, and organisations choose, purchase, utilize, and discard products, facilities, ideas, or practices to meet their wants and desires. Theoretical review and published papers in the 2nd decade of the century use a three-staged model in which decision-making by consumers is assumed to be described by a data processing model, as shown in Figure 1:

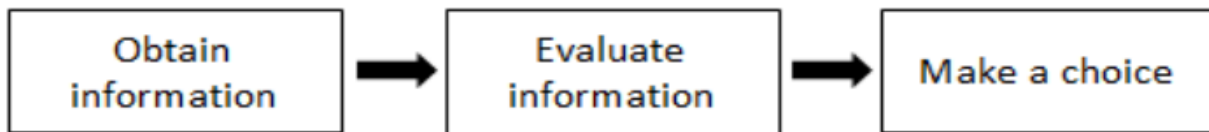


Figure 1: Customer behaviour analysis: information processing model

Source: Solomon, 2006

Clients, based on the information processing methods, gather information first, then comprehend and evaluate something before making a conclusion. Nevertheless, in the twenty-first century, this pattern is seen to be overly generic and ambiguous, making it almost hard to employ and utilize it for particular marketing choices concerning message positioning and content. As a result, various models have been constructed to characterise purchasing behaviour thoroughly.

The Nicosia model of the customer choice procedure (see Figure 2) and the Engel-Blackwell-Miniard model (see Figure 3) of analysing customer behaviour are two of the highly thorough models.

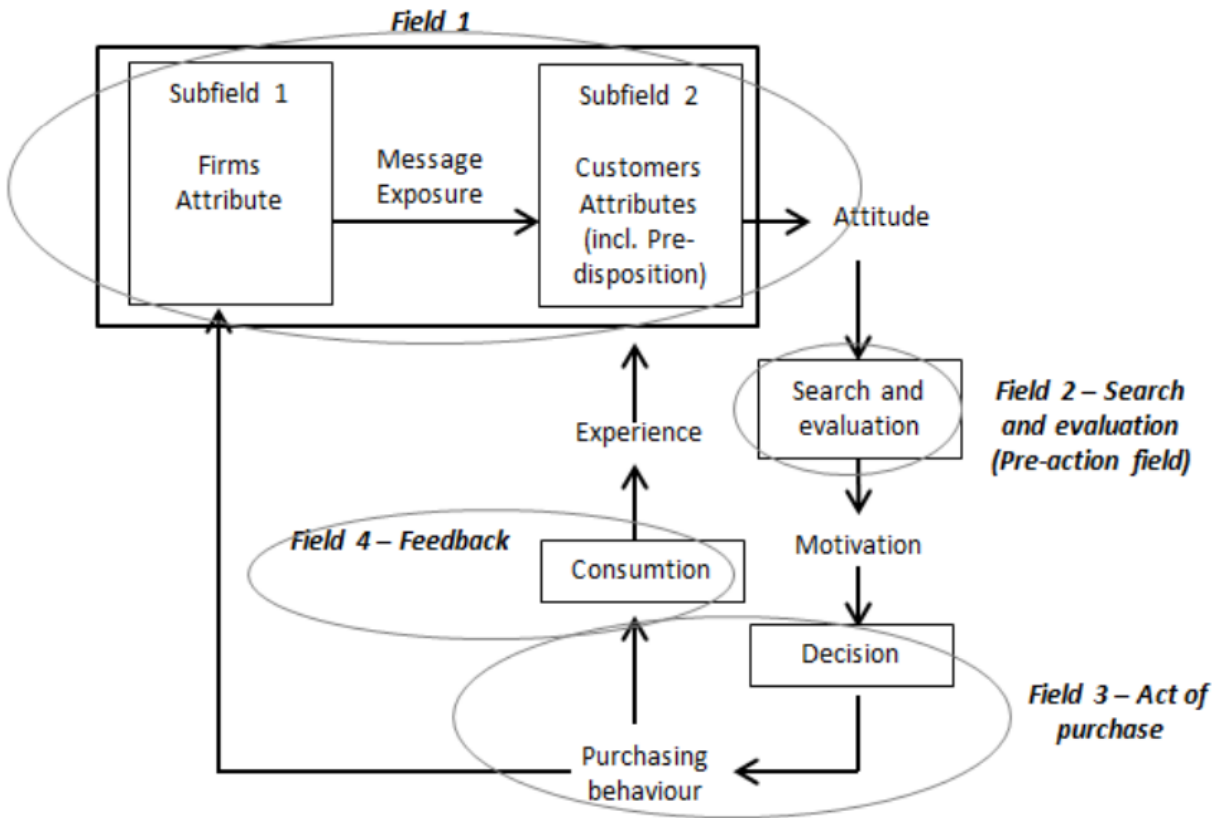


Figure 2: Customer behaviour analysis: Nicosia model

Source: Nicosia, 1966

This customer choice procedure model is one of the early customer decision-making procedure models, which were acknowledged via the majority of marketing specialists at the time. It includes of four major fields: consumer attitude construction, information exploration and assessment, an obtaining process, and client feedback upon product consumption. In the model, consumer attitude, enthusiasm, purchasing behaviour, and knowledge are the outcomes of consistent key fields, and these outcomes have a substantial impact on the following sections (Nicosia, 1966).

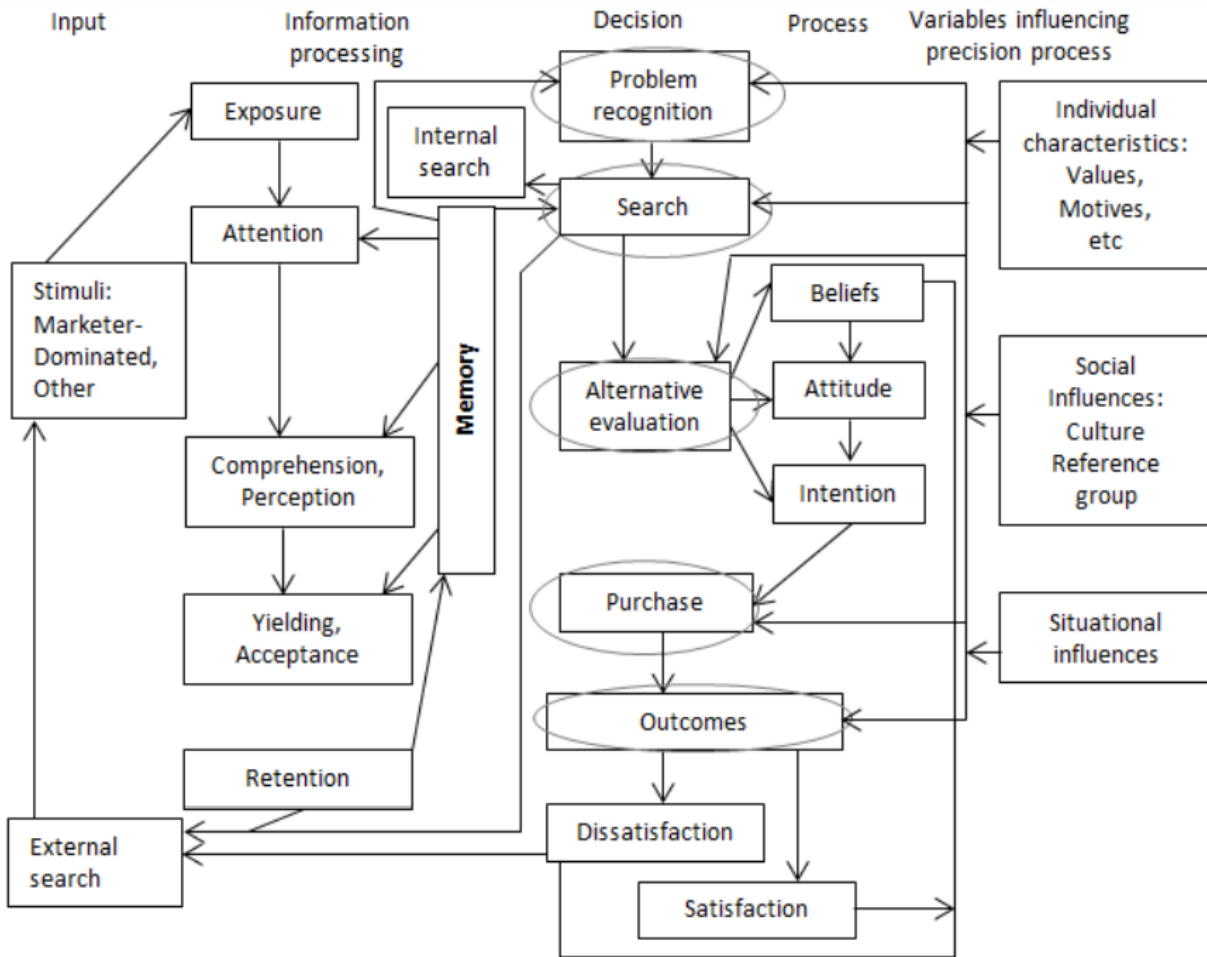


Figure 3: Customer behaviour analysis: Engel-Blackwell-Miniard model

Source: Engek et al., 1968

The figure above exemplifies the Engel-Blackwell-Miniard model of the analysis of customer behaviour, which was initially issued in the year 1968. This model depicts the phases of decision-making that are influenced through personal qualities (for instance reasons and principles), societal factors (for instance culture), and situational impacts. Engel (1968).

The modern marketing assessment of customer behaviour begins with a grasp of the stimulus-reaction paradigm (see Figure 4). In the stimulus-reaction model, outside setting issues or stimuli and inner setting variables are the two major types of elements that influence human conduct. Outside environment elements are divided to two categories: marketing stimuli that enterprises might influence, and further stimuli, over which they possess extremely little control. These outside influences possess an implicit impact on both consumer attributes and customer

consciousness. The flow Figure 4 depicts how, along with perception, three additional psychological practices - inspiration, learning, and remembrance - have a significant impact on customer reaction (Kotler, 2012).

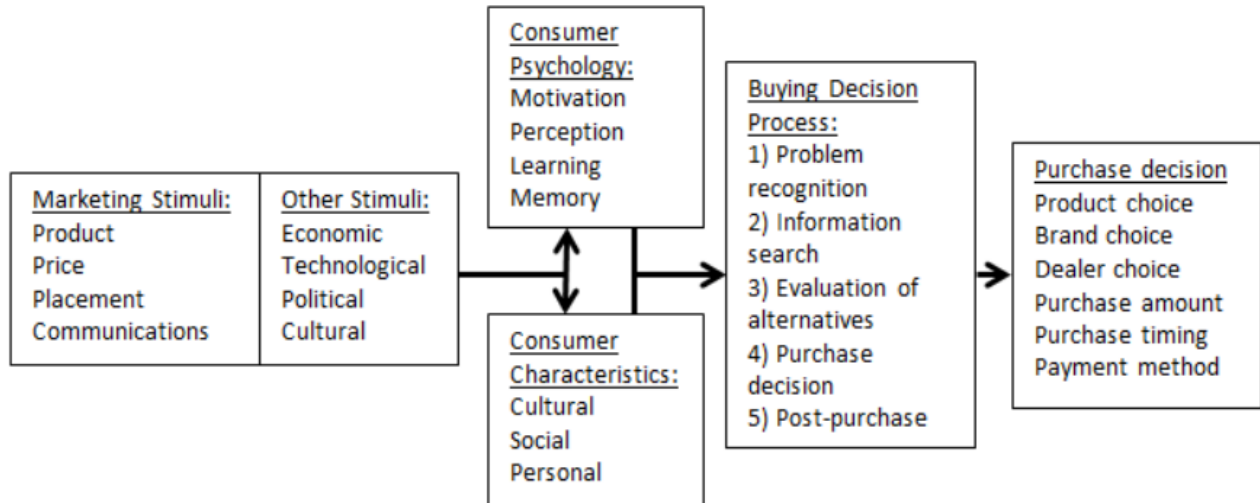


Figure 4: Customer behaviour analysis: Stimulus-reaction model

Source: Kotler et al., 2012

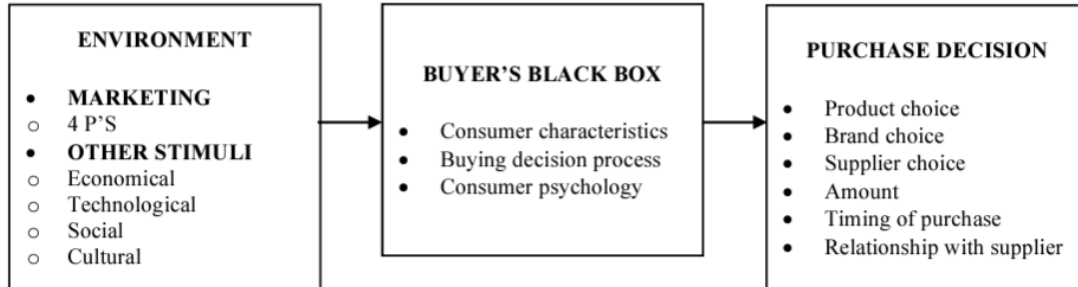


Figure 5: Customer behaviour analysis: Armstrong & Kotler model

Source: Armstrong & Kotler 2015

The above figure is a demonstration of a customer behaviour analysis model established by Kotler and Armstrong (2015). This model of customer behaviour depicts how external cues go into the customer's black box to elicit a reaction, namely, a buying choice. Environmental stimuli include both marketing and non-marketing factors. The “4 P”s of marketing are product, pricing, placing, and promotion. Further triggers include economic, technological, societal, and cultural variables that are appearing in the customer's surroundings. Consequently, external stimuli possess their particular input on the customer's black box, influencing attributes, decision-making

procedures, and even psychological activities. Ultimately, it is the customer's perception of something, which drives their purchasing choice (Armstrong & Kotler 2015).

Each of the formerly described groupings of elements (marketing stimuli, further stimuli, consumer psychology, and client attributes) are important in the purchasing judgment procedure of clients. The figure below demonstrates the traditional consumer purchasing decision course comprising five phases.

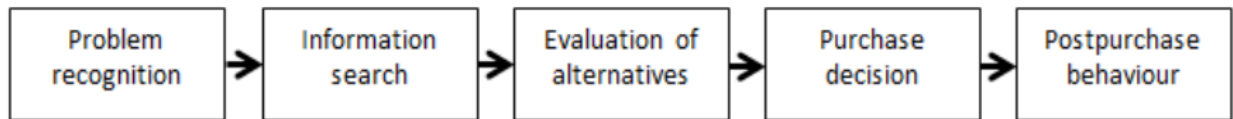


Figure 6: Classic 5-stage customer buying decision process

Source: Kotler et al., 2012

The conventional 5-phase model indicates that the customer more often than not goes over 5 phases, which are recognition of the need, search for the information, assessment of substitutes, buying choice and post-buying comportment. This model suggests that the acquiring course commences long before the factual obtaining and outcomes long afterward (Kotler, 2012). The majority of people's search behavior and evaluating alternatives vary slightly. Author Kaas defines the data review process by breaking it down into phases (see Figure 7).

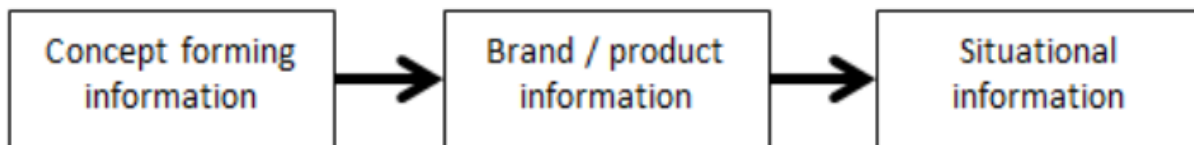


Figure 7: Information search process

Source: Kaas, 1982

These levels are determined by clients' marketplace awareness and rate of recurrence of buying. Clients who are unfamiliar with the brand or good join the notion formation stage, when they find out about the good, and traits and characteristics of it. Clients create their selection principles during this step. They then go to the marque/good information phase. Customers that are acquainted with the good, yet do not acquire it on a consistent base fall into this category. The mentioned clients obtain brand-particular data in order to liken data regarding a goods established

features. Clienteles then progress to the situational knowledge phase, when they acquire just specified info (Kaas, 1982). The 5-phase model assumes that consumers cautiously and logically digest as much good data as feasible, that they weigh all of the benefits and disadvantages of a good, and that they come to the plausible conclusion. Nevertheless, majority of buyers do not follow this rational procedure each time they purchase anything (Solomon, 2006).

According to the majority of theories, the consumer decision-making procedure is divided into three phases: cognitive, emotional, and behavioural. For the duration of the cognitive stage, the client's psychological progressions are impacted, as a result, product perception is developed. During the affective phase, the customer connects with his/her emotive or feeling reactions and forms a variety of connections and viewpoints about the merchandise. The consumer is led to a certain act(s) during the behavioural phase, that is usually a purchase activity (De Pelsmacker et al., 2007).

The majority of the hitherto stated models presume that the client passes over reasoning, emotional, and behavioural stages in that order. Nevertheless, there are many debates about this structure, and various experts have proposed other alternatives. Author Vaughn proposes four distinct sequencing models in his Foot - Cone - Belding (FCB) grid model (see Figure 8) (Vaughn, 1986).

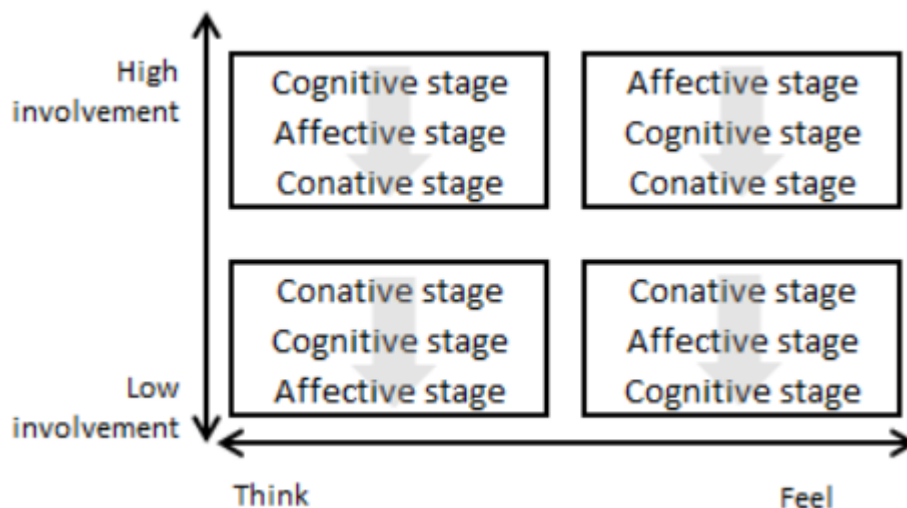


Figure 8: Foot - Cone - Belding (FCB)

Source: Vaughn, 1986

The FCB grid distinguishes four stratagems: 1) informational; 2) emotive; 3) habitual; and 4) satisfaction. Informational approach (Learn - Feel - Do) is applicable to high-end goods when economic concerns are paramount. This structure is excellent for items for instance automobiles and insurance. Emotive method (Feel - Learn - Do) is appropriate for transactions involving a high level of emotional engagement. These items are frequently used to meet self-worth demands, and more emotive interaction ought to be used to get to the customer. For things such as cosmetics, jewels, and designer apparel, the Feel - Learn - Do structure works effectively. While customers make everyday purchases, the habitual technique (Do - Think - Feel) functions well. Clientele come to know regarding items following (trial) consumption in these circumstances. They build receptive behavioural skills through doing. Even though the customer may have a lesser extent of understanding prior to making the acquisition, in-depth understanding of the good is not required. This method is used in the production of paper, cleanup supplies, and petroleum. The satisfaction technique (Do - Feel - Learn) is suited for low-involvement items that represent the specific characteristics of the consumer and are seen as a little gratification. Welcoming cards, beer, cigarettes, and candy are instances of this kind of things (Vaughn, 1986).

The conventional banking and financial model has been in place for a long time, if not centuries, but the economic collapse of 2007/08 have generated a perfect environment for a new generation of competitors. New entrants are empowered and conceived as a result of advancements in innovations and modifications in the regulatory framework, that have really reduced the barriers of entry to the banking industry. As a result, in addition to the traditional criteria for categorizing bank business strategies, the advancement and expansion of financial innovation (fintech) and its application in the provision of banking services facilitated the development of new bank models for example the virtual bank concept and also the Neobanks model. The key differences between the various bank models are their operating effectiveness, the capability to quickly adjust to changes in client preferences and attitudes, and the use of gathered information. As a result of the requirement to own a branches network and ATMs, traditional banks face high operating costs, whereas neobanks minimize such costs because they operate as a completely online bank. Furthermore, because technological innovation is an integrated part part of the digital bank as well as neobank economic models, such banks can stage of implementation creditworthiness techniques for use in appraising their customers. As a result, those who were also capable of comprehending customer needs in addition to client behavior and customize it according.

Accepting investments and financing funds are really the two primary responsibilities of a financial institution; however, various factors have resulted in a dramatic increase in the amount and wide range of services and products provided by financial institutions. The increased development of innovative services and products generated an environment that promotes the creation of innovative business strategies that financial institutions can integrate in their own core activities. As a result, bank business frameworks can be considered in terms of something like the sections or customers those who serve, the solutions they provide, the sources of financing they use, how they provide their services, and the technology they use used in their own everyday activities. Three classic bank's business processes have been identified based on financing sources or customer types: retail, wholesale funded financing bank, and stock markets focused bank (Roengpitya et al., 2014). Furthermore, different business practices in the commercial bank industry may be determined based on various determinants such as revenue sources, financing objectives, secondary activities, geographical expansion, income variability, level of risk and so on.

Furthermore, as a result of causes such as industrialization, changes in customers' requirements, the need to attain economies of scale, specialization of core company operations, changes in the legal environment, and technology breakthroughs, new business models have emerged. However, one critical element of the financial system was the absence of or restricted number of prospective entrants. New companies found it exceedingly hard to keep up effectively with highly advanced and well-established financial organizations with large levels of assets and well-developed systems and networks (Klarova and Hopkinson, 2019).

The favorable position of operating in the banking system was disrupted either by events caused by the 2008 economic crises, that highlighted serious flaws in the way traditional classical banks perform their activities. As a result, four key forces influenced changes in conventional banks' business strategies: improvements in customer requirements, degree of income volatility, growing competition, and legal structure changes (European Banking Authority, 2018).

Changes in policy, concurrent technical breakthroughs, and other reasons all contributed to the emergence of different forms of rivals that challenged old business structures. It is

undeniable that the financial system is undergoing considerable digital change, with new fintech (fintech) advancements having a big impact on bank economic models (Japparova and Apoga, 2017). Conventional bank business strategies with widely dispersed physical branches has become outdated as a result of technology breakthroughs, resulting in the emergence of new rivals. These new rivals come from the Fintech industry, which provides banking services and products that were formerly offered by banking organizations (OECD, 2020).

Financial services digitalization disrupted current business procedures. It facilitated the growth of financing models that are based largely on a different type of information in their day-to-day activities (Gasser et al., 2018). As a result, digitalization is viewed as a viable opportunity for the overall financial sector because it can help with processes such as attracting customers, increasing brand loyalty, a better understanding of the market, service customizations, increasing revenue sources, and decreasing cost levels (Japparova & Apoga, 2017). However, developments in the banking industry's business model did not lead to adjustments to the types of tasks done by banks; rather, the shift occurred in the manner in which these duties are carried out.

Financial innovation, or 'FinTech,' is noticeably evolved beyond the beginning period, posing a global challenge to the burgeoning digitalization of the financial business. Since 2008, worldwide fintech finance activity has risen notably in the United States, and since 2014, in Eu. A cloud-based and mobile-based banking age with personalized banking operations and security forecasts that online banking will remain evolving and be really well to be more reliable and please users.

Online banking is not limited to utilizing the internet to access financial services, as is commonly assumed, but it encompasses a wide range of financial services given or consumed through tech. As a result, digital banking comprises the following:

Net-banking: The internet is a strong medium that banks utilize to deliver services at various levels. This includes giving essential information about the banks' different goods and services, interacting with clients about current balance sheets or credit applications, and enabling consumers to do activities such as paying bills, cash transfer, and other similar things through the internet.

Mobile banking: It allows a consumer to speak with the bank and issue simple instructions using their mobile keyboards on a cellphone. It enables consumers to deposit a check, withdraw cash, pay bills, checking account, discover an ATM, and get real - time status.

Automated Teller Machines: they were the first popular machines to give clients with electronic access. Automated devices allow customers to accomplish functions such as money transfer and total balance inquiries without the assistance of a bank personnel. Customers may also print their pin number, direct deposits, and open a line of credit on the most advanced devices.

Plastic Cards: it might be in the shape of the one of them: debit, credit or smart card. Such cards, in turn, facilitate the procedure for making payments at the point of sale, allow quick access to credit for a certain length of time, or may execute a variety of pre-defined financial operations.

Electronic Clearing Service (ECS): ECS is used to make repetitive and recurring payments electronically. It is commonly utilized by organisations to make bulk payments for the distribution of dividends, interest, income, pension, and so on, or to gather bulk payments for home utilisez such as electricity, gas, water and so on.

Electronic money transfer techniques are designed to move payments inside a financial institution between many several institutions without the intervention of bank personnel. This type of transaction occurs over a network connection.

Personal computer banking: A computers with a dial-up aspect relates to the telephone system allows consumers to communicate with their bank. Nevertheless, it has high maintenance expenses (Singhania and Sardana, 2018).

Banks benefit from using digital ways to deliver services. It lowers operational expenses by reducing back-office procedures, reducing mistakes, and reducing the number of hands required for operations. It enables a bank to reduce its branch network while still providing services in an innovative and appealing manner. This improves service quality, delivery, and efficiency, which may provide a competitive edge to banks that use digital technology. By reducing geographical constraints, it allows local banks to expand their operations. Not only that, but digitalization has benefited banks in speeding up data gathering, administration, and financial engineering, allowing

creditors to better analyze the credit worthiness of prospective borrowers. Numerous research studies have demonstrated that as technology grows, so does the banking sector's effectiveness.

Customers of banks are no longer misinformed, but they are aware of how to safeguard their interests. They can quickly transfer banks if they are dissatisfied with the services. According to research, demographic criteria such as income, gender, and education levels have a significant impact on customers' desire to use digital banking. It was also claimed that increasing client knowledge, technology literacy, and abilities would limit these elements' power to obstruct the usage of online and digital banks. Furthermore, simply having an online presence is not what users of the digital banking seek. They desire exceptional value and high-quality basic services (1), a strong brand reputation (2), a wide range, diversity, and competitiveness of financial goods (3), and a strong dedication to customer service, requirement, complaints, and pleasant experience (4). (Dubina et al., 2020).

2.5 Existing models

Consumer service is one of the three primary reasons a consumer will pick a certain commercial bank. Nonetheless, commercial banks are not able to optimize their customer experience strategy without first understanding their behaviour. With the aim of comprehending the customers' behaviour, commercial banks should execute a customer behaviour assessment (Vazifedoost, Ansar & Yekezare, 2013). Consumer behavior analysis include investigating customer behaviors, identifying the stages people bring in their banking experience, and understanding how external influences such as societal trends influence their selection (Devlin, 2002). Commercial banks can develop methods to customise their clients' experiences by using the research approach outlined above (Vasiljeva and Kreituss 2021).

Whereas many banking institutions strive to build highly personalized customer connections, this is not prevalent on the business side (Storbacka, 2010). However, a more customized experience would enable commercial banks to give more focused marketing and offerings to their consumers, increasing customer satisfaction. Banking institutions can uncover trends in consumer behavior that they can utilize to forecast the next step in the buyer journey by analyzing client behavior. This allows commercial banks to anticipated consumers' expectations

at each stage of their journey, allowing them to plan ahead of time to satisfy clients' demands (Vasiljeva and Kreituss 2021). Commercial banks can forecast the following activities using data:

- What criteria influence whether a banker should phone, send an email, or organize an in-person meeting?
- What signs point to the possibility of a client switching to another bank?
- Which leads should be prioritized? (Fernandes and Pinto, 2019)

Commercial banks may then adjust to each customer's unique demands and give the greatest assistance by unearthing these insights. It increases the commercial bank's profitability and turnover. Conducting a consumer behavioral study allows banks to keep track of shifting trends and consumer expectations and respond accordingly. Conforming to an Accenture report, more than 50% of banking consumers now anticipate an ecommerce platform. Consumers are gradually seeking self-service alternatives from banks, with self-service participation growing by 69% between 2020 and 2021. (Accenture, 2021). Following to trends puts commercial banks ahead of the competition, keeps them relevant in the economy, and keeps clients delighted (Vasiljeva and Kreituss 2021).

Technological changes and the country's economy are driving faster changes in customer habits and tastes than at any other recent time in history. To keep pace, banks that have constructed their businesses with a commodity perspective ("if we create it, customers will follow") may consider transitioning to a more consumer stance. One successful strategy to achieve that change is to build the almost mystical 360-degree vision of the client, one that takes into consideration both their present and projected lifetime worth. Banks frequently have profound insights on their clients; in fact, they are typically ahead of their competitors when comparing to several other businesses. The problem is that these ideas are frequently not disseminated across the institution. While legal restrictions may limit extensive sharing of consumer data, there is still plenty that can be done to bring customer data up and out of silos in order to provide a more comprehensive, consolidated, enterprise-level perspective of consumers.

Identifying and communicating the necessary data at the appropriate levels is merely the beginning. The issue then becomes, "How would you leverage data to gain consumer insights?"

Most banks' systems and procedures generate more data than ever before, and the amount is only increasing. There's a considerable probability that after gathering these many strands of data, the business won't know how to use it efficiently. Certainly not with the same old information and data management methodologies.

After years of extensively investing in business analysis, it's natural for many institutions to ask if there's actually a distinction between professional business analyses and the capabilities built as part of their BI initiatives. The excellent news is that business intelligence (BI) continues to play a crucial fundamental role in analytics - in layman's terms, it's terrific for cutting and slicing information to comprehend what occurred in the past and monitor critical performance measures. BI applications include core platform installations, back-office consolidations, and transaction price evaluations. The restriction is that they do not anticipate what may be around the bend. If BI is about looking back, analytics is about looking forward, anticipating and improving to provide more effective future outcomes. Companies that use an analytics strategy may engage in activities such as prognose economic and process improvement.

In theory, analytics may be used to find deeper insights everywhere a bank collects data. This is certainly not to say that obtaining each additional insights is profitable; in reality, one of the biggest serious risks of analytics is wasting critical time and resources on the inappropriate insights. In our perspective, four areas are good candidates for an analytical methodology.

Customer acquiring

This is another thing to get information about your consumers after they've successfully registered for your services. Consider how effective it may be to gain real-time information regarding individual prospects in order to better enhance the company's engagements with them when they progress through the selling process. Consider the impact of leveraging these information to increase the demand for your goods as well as services on a consumer basis. Banks must have analytical and data skills, in addition to marketing and assessment capabilities, to build and manage a successful customer acquisition plan. These skills, when combined, may assist businesses in acquiring consumers, automating decision and processing formation, managing customer accounts, and lowering customer engagement costs and dangers. Banks could focus their possibilities extra efficiently by finding potential consumers and aligning their business goals by

segmenting the client pool through market analysis, marketing research, based on demographic profiles, as well as analytics technologies. Banks may increase their team has good abilities by using more focused, relevant messaging for offerings. They should also use rating and segmentation techniques to choose the best offer accessible to those candidates by establishing one of most appropriate financing terms. They should also decide which customers will be lucrative in the longterm while posing the lowest risk. Following that, banks must think about making offers to the specified client categories.

Following are some concerns banks should examine in required to bring out these tasks effectively:

- Conduct past prospective economic principles: Seems to have the bank examined previous performance of prospective clients in terms of initial amounts, usage, profits, and other factors?
- Prospect segmentation: Has the company found groupings of possibilities that are both internally and outwardly comparable to other groupings of possibilities?
- Assess prospective campaign performance: Has the bank assessed the efficacy of real prospective marketing activities in comparison to expectations?
- Evaluate prospective possible: Has the bank calculated the future benefits of each opportunity to help with prospect prioritization?
- Determine the probability of potential forgery: Has the bank calculated the risk that prospective clients and accounts are false or misleading?
- Evaluate prospect cost estimating process: Has the bank calculated the flexibility of prospect price?
- Calculate the prospective offering rate of response: Seems to have the bank calculated the prospective return rate dependent on proposal character traits?

- Improve prospective entire portfolio: Seems to have the bank selected possibilities for action and selected the best solutions — encompassing product, price, method, promotional strategy, and scheduling — to meet management's growth and profitability goals?

Service

Many banks have the issue of serving clients after they have been bought. Customers nowadays are significantly more intelligent than ever before, prompting banks to address crucial issues such as:

- How frequently must a bank communicate a certain customer?
- Which platforms should I use to serve this customer?

To complicate matters even more, new constraints on fee revenue and borrowing costs make it increasingly vital to understanding each customer's economics and discover strategies to acquire marketshare in the most lucrative sectors. To succeed, banks should reconsider how they divide and focus on their clients in order to get a larger share of wallet, combining social analytics and large datasets to develop comprehensive systems for sales and service. Tactics such as window pop-ups that show after clients complete a transfer or goods receipt promotions that provide discounts may help banks modify their offers to shifting customer expectations.

Several analytics tools help to banks in determining the appropriate degree of service to provide to their clients as either groups or individuals. there are some questions to think about:

- Profitability of customers: Has the bank determined the customer's present economic worth and the up a comprehensive of that worth?
- Customer segmentation: How has bank determined groupings of consumers that are both internally and outwardly comparable to others?
- Service method preference: Has the bank established the ideal service channel for each client based on activity?

- Loss mitigation efficacy: Has the bank assessed the historical success of approaches, as well as variance consumer type?

- Default probability and severity: How has bank calculated the possibility of a client failing on a loan program within a certain time frame (e.g., 12 months), as well as the loss in the event of default?

- Transaction fraud probability: Has the bank calculated the possibility that a certain transaction is fraudulent?

- Service network optimization: How has bank established techniques to properly align service system throughput with consumer and bank expectations for each client?

- Default administration optimization: How has bank identified which methodologies, such as line adjustment, loan, collections and asset disposal, would be most successful at what point in time in order to assist enhance banks' performance by each consumer?

Building Relationship

Creating a close connection with clients is a natural - and crucial - phase in the consumer lifecycle. When informal ties begin to develop, your clients will become devoted banking customers. Banks begin creating in-depth connections when they show that they know sufficient information about a client to deliver the needed items at the appropriate times — throughout this example, goods and services. Also, understanding which information to give a consumer is a less costly proposition for banks than less focused efforts. Any cost savings may be used to support exclusive offerings that the rivals might struggle to match. Furthermore, if consumers believe they are getting customized care, they are more likely to be loyal for reasons other than pricing.

The amount of connection that a bank builds with one client may vary from that of another comparable customer. Institutions should investigate variables that might demonstrate the worth individual clients contribute to the bank in order to select the appropriate connections. These features are as follows:

- Approximate wallet portion: Has the bank calculated its estimated percentage of the customer's entire financial services wallet?
- Customer campaign efficacy: Has the bank assessed the actual success of relationship building marketing efforts in comparison to expectations?
- Cross-sell loss/win analytics: Has the bank used win/loss data to forecast admission standards for future cross-selling projects?
- Lifetime value: How has bank calculated a customer's lifetime worth over a specified time period, as well as the relative significance of the elements driving value (for example attrition, balances, products, risk)?
- Probability of new account fraud: Has the bank calculated the risk that a bank user is based on false information?
- Customer investors' perceptions: Has the bank calculated the elasticity of customer pricing?
- Estimation of customer offer response rate: Has the bank calculated the probability of approach based on proposal characteristics?
- Client relationship improvement minimization: How has bank recognized consumers for action and selected the best offers — such as product, price, distribution, promotional strategy, and scheduling — to meet management's business and profit goals?

Customer loyalty

Developing and executing client retention initiatives should be towards the head of most bank managers' to-do lists today. According to a major consultancy company, the cost of recruiting new clients is several times more than the cost of keeping and extracting value from current customers. You could suppose that with the impending economic collapse, banks have nothing to do with their present customer bases. Consider again. Understanding your customers' demands and achieving or surpassing their expectations are critical.

A successful customer retention plan categorizes each category of consumer (silent attrition, wanted, and unhappy) and develops activities to improve their attitude. As part of any client retention plan, banks should be ready to ask the following questions:

- Examine customer voice: Has the bank gathered wide consumer input via points of connection and used it to promote positive change and fulfilment? The use of innovation, particularly mobile phones and social media devices, has enabled banks to get near-instant client feedback on service levels, product efficacy, pricing adjustments, new goods, and specialized promotions.

- Investigate past attrition: Has the bank identified historical attrition levels as well as the major causes of variances in high turnover by consumers and accounts?

- Examine the success of client retention initiatives: Has the bank assessed the efficiency of actual preservation campaigns in comparison to expectations?

- Forecast the probability of client attrition: Has the bank evaluated the chance of a consumer or product relationship ending or significantly shrinking over a specified time period?

- Calculate customer risk: How has bank calculated the approximated risk premium from probable customer loss by integrating forecasts of customer profitability as well as lifetime value with attrition probability?

- Calculate the probability of client reaction based on offer attributes.

- Enhance customer retention strategy: Seems to have the bank identified consumers for action and determined the most relevant offerings — such as price movements, new network offer, outbound contact, or without doing anything — for each client?

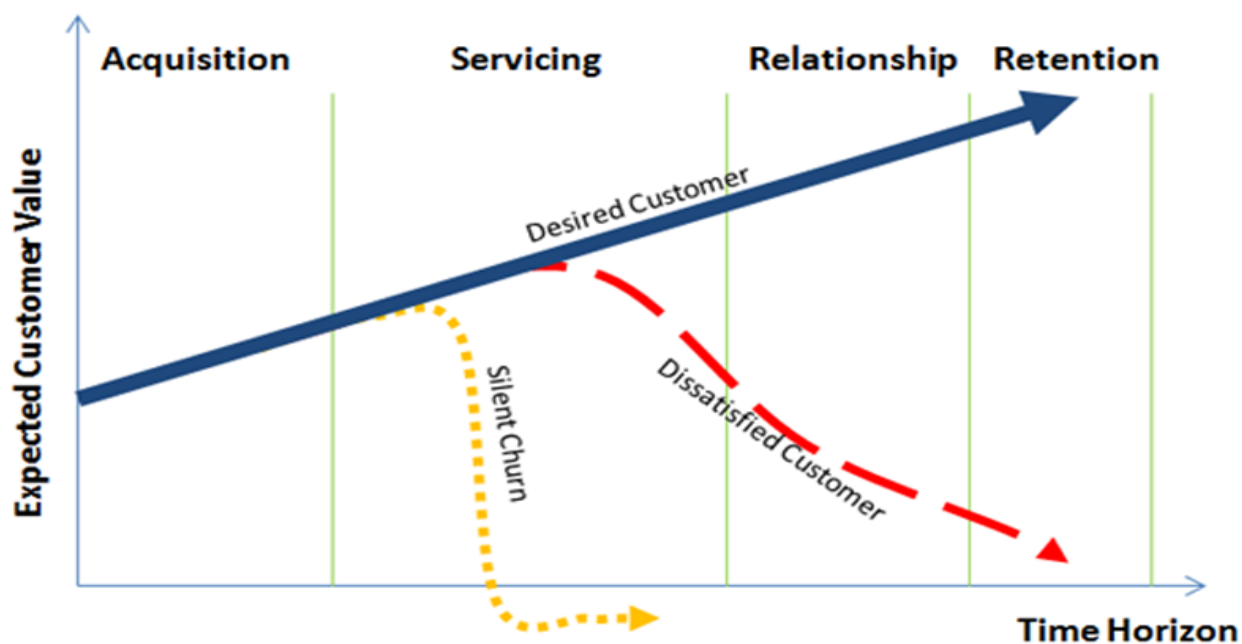


Figure 9: Four Major Areas of Customer Behaviour Analytics Based for Banking Services

Source: [Deloitte, 2011](#)

The banking has developed to be progressively reliant on information structures, and the usage of most current technologies has grown in importance. The banks should make the utilization of sophisticated applications for delivering customized facilities and products to their clients other than in Transaction Monitoring. As a consequence of the banking sector's critical intermediation function in financial marketplaces, the examination of different financial characteristics of banks holds an important position in scholarly research (Tzeremes, 2015; Zopounidis et al., 2015). More than a few researches in this field make utilization of artificial intelligence (AI) technologies, in response to the growing demand for more complex methodologies in banking study. Accordingly, the present literature uses AI methodologies to investigate several important study topics in banking research, for instance tackling the impartiality subject in the evaluation of banking performance (Chen, 2020) and enhancing the precision with which default risk and bank failure is predicted (Boussemart et al., 2019), in addition to supporting integrated establishments (for instance the head offices of the banks) to incentivize their units (for instance the branches of the banks) and enhance their performance (Afsharian et al., 2019). A growing tendency in the use of artificial intelligence approaches to handle banking difficulties demonstrates their growing significance and applicability in this industry (Yao et al., 2017; Manthoulis et al., 2020).

AI technology advancement has surged throughout the previous three decades. AI approaches have been used to a broad array of areas, including commerce, teaching, finance, and medical, expediting examination through transforming information to clear and workable insights. The use of AI-powered practices allows for the faster resolution of both functional and theoretical difficulties, such as the estimate of optimum guidelines, the assessment of customer preference, and the application of causative interpretation to average treatment impacts (Athey & Imbens, 2019). Different from customary statistical models, AI-driven approaches enable the building of a model that, presented a certain input, gives a resilient response over teaching. AI, in particular, does not have to be dependent on established set of rules, for instance the tasks necessary in conventional models, but rather detects patterns in information grounded on past input/output instances, constructing an algorithm appropriately. Conceivably more importantly, AI is able to manage complicated data linkages including photos, videos, or text in atypical forms (Doumpos et al., 2022).

As a branch of artificial intelligence, machine learning has gained significance in the last ten years. Machine learning techniques are used to solve controlled and uncontrolled learning challenges. For the former, econometric and classification models are often created in a framework of prediction, while descriptive methods are employed for the latter (e.g., clustering). According to Fethi and Pasiouras, machine learning techniques may also be used to assess bank performance, anticipate bank collapses, and evaluate credit ratings (2010). In commercial contexts that are becoming more and more data-rich, machine learning methods are preferred for their automation potential. Additionally, when more observations are added to the current data sets, machine learning algorithms can manage high-dimensional raw data and constantly enhance their efficacy and accuracy (Jordan & Mitchell, 2015).

Systems that use machine learning and natural language processing (NLP) are used for a variety of tasks, such as automatically and dependably responding to client inquiries, monitoring spending and saving habits, and processing payments on the clients' behalf (Vijai, 2019). Automating mundane tasks and processes may result in cost savings, a decrease in human error, and the release of laborers to focus more on activities that provide value (Boobier, 2020). Banks are also using big data analytics technologies powered by AI and machine learning to provide more quick and personalised customer service (Doumpos et al., 2022). Because customers are the

driving force behind any service business, AI may be used to better understand their needs and routines (Ghandour, 2021). As a consequence, banks can now better tailor their products and services to the needs of their clients.

In addition to customer-facing banking apps, big data analytics technologies may be used to assist banking executives and managers in making more informed decisions regarding various internal company operations, investments, risks, and resource consumption. More compelling use cases for big data analytics and machine learning include identifying fraudulent transactions, improving business policy and legal or regulatory compliance, offering secure transactions, and predicting future occurrences (Kaur et al., 2020; Sastry, 2020). Therefore, AI technology is prepared for application in the financial sector. Technology is being used by banks to enhance customer experiences, increase service effectiveness, deepen customer relationships, foster company growth and competitiveness, and respond quickly to both internal and external changes (Ghandour, 2021).

Artificial intelligence in banking offers a compelling business case. Robots, natural language processing, big data analytics, machine and deep learning, neural networks, and predictive analytics, among other AI-based technologies, may modernize and streamline both internal and external processes. Banks have the opportunity to acquire unique talents that set them different from rivals thanks to AI systems. One of the primary facilitators of these skills is the capacity to make sensible business choices, enhance corporate operations, provide accurate predictions, and respond promptly to internal and external changes (Boobier, 2020; Kaur et al., 2020). By using 24/7 customer care, banks are able to deliver greater customer service and engaging encounters (Lui & Lamb, 2018; Kumar, 2020). Big data analytics is also used to better understand customers so that customized products and services may be offered. Königstorfer & Thalmann (2020) assert that AI may reduce losses associated with lending. Predictive analytics, machine learning, and statistical models are tools that banks might employ to foresee financial catastrophes like the Great Recession of 2008. (Kasztelnik, 2020).

Technologies for big machine learning and data analytics may be utilized to quickly manage vast volumes of continually changing information and derive valuable insights. The use of standard information technology would make such a feat very impossible (Sastry, 2020;

Mhlanga, 2020). Enhancing organizational agility in terms of reacting to new issues may be accomplished by speeding up the insight creation process. However, the most significant factor influencing AI's ability to predict outcomes is the availability of big, high-quality data (Mhlanga, 2020; Kasztelnik, 2020). AI might possibly have a negative effect on customer relationship management since it is viewed as lacking "human touch" in customer care (Jaki & Marin, 2019). However, younger generations may be able to adapt to "faceless" AI systems given that they are often more computer savvy than older individuals (Ghandour, 2021).

In the current digital era, banks are rapidly offering AI-based mobile banking and online banking solutions to allow 24/7 transactions (Doumpos et al., 2022). To put these ideas into practice, significant business- and customer-related datasets must be obtained, examined, and stored. Machine learning methods are being used to comprehensively and reliably evaluate these datasets, combining different forms of data to provide insightful results. There is thus a greater likelihood of costly data breaches and privacy infractions (Kumar, 2020). In spite of the fact that anomaly detection, deep learning, machine learning, and predictive analytics are just a few examples of AI solutions, they are frequently praised as excellent enablers of the best information security and privacy protection in banking (Soni, 2019; Königstorfer & Thalmann, 2020). However, the cost of deploying and maintaining AI-based cybersecurity may be unaffordable (Soni, 2019). Additionally, due to the growing use of consumer analytics and social media analytics technology, continual collaboration between banking and regulatory institutions is required to improve cybersecurity and privacy protection (Boobier, 2020).

The availability of ubiquitous mobile technology, safe online banking, and a massive amount of financial data at the touch of a screen has resulted in the emergence of a diversified audience of banking customers, all with their own set of requirements and desires. Consistent with the research executed by Accenture ([2020](#)) operated on 33 thousand customers over 18 marketplaces, clients anticipate digital modernization, which means that banks' value propositions must evolve for suiting specific, developing client demands. Bank sector is one of the not many businesses that has access to abundant consumer data bases. The data a commercial bank possesses on a client exposes - and even anticipates - important behavioural data. Additionally, the data acquired may be provided to other divisions (for instance, product improvement, marketing, talent management, and client support) in an information-powered fashion, assisting them in improving

their decision-making procedure. The idea of exploiting client data to enhance income is equally appealing (Theuri and Olukuru, 2022).

Artificial Intelligence-driven Customer Behaviour Analytics is a novel creation of customer intelligence solutions that employ a variety of model behaviours. It offers firms with information about client behaviour and advancement, enabling them to create knowledge and client managing expertise on an information basis. Furthermore, applications of AI enable commercial banks to always stay one step onward of client demand and in close proximity to the organization's sensitivity, revenue, compliance, and additional risk circumstances (Payne et al., 2021). AI-grounded applications are able to make decisions grounded on the gathered information. As an instance, a group of individuals might be sent emails and notifications via the AI applications. This procedure enhances their attachment to the brand and heartens the clients to continue with using the bank's services. AI-powered sophisticated knowhows obtain client intuitions, by the help of utilization of the client demographics and psychometrics while perusing the internet. These applications gather the data regarding the online behaviour of customers and examine that information. This information supports boosting sales and delivery of the services, through targeting clients that would be most attracted in particular services and would most probably be eager to use the service. In addition to this, applications enabled thru artificial intelligence can help with customer churn estimation, which calculates how many clients are putting off the specific product or service. Chasing churn rate presents understanding to the strength of the commercial bank, since comprehending which direction the business is moving enables decision makers to take make appropriate moves, so that they can revise and make enhancements prior to anything leaves the track (El-Gohary et al., 2021).

A client behaviour assessment at commercial banks might possess an even greater scope. This increases customer revenue as enhancing preservation by using actionable information to aim for the correct consumer at the correct time, over the appropriate channel, via the greatest offer. For instance, commercial banks might use social networking analytics to give personalised suggestions/facilities to specific clients on the foundation of latest life experiences (for instance, new role, getting married or divorced). Keyhole is a fantastic solution that excels at assisting marketing divisions in getting into the heads of their consumers through optimal posting, competition tactics, audience development, automatic account KPI reportage, and so forth (Xu et

al., 2020). A comprehensive consumer behaviour study gives useful insights to the different aspects that impact the targeted audience of the commercial banks. This provides an overview of the primary goals, motivations, and decision-making procedures that are considered along the client journey, enabling banks comprehend what clients think about their services. In the longstanding, this kind of an examination might be utilized for enhancing the customer networks, modernize CRO, and eventually, upsurge revenues (Perez-Vega et al., 2021).

Financial organisations of all ranges have begun to investigate the intrinsic possibilities of AI, specifically when it comes to providing superior, completely tailored, customer-centred facilities (El-Gohary et al., 2021). The magnificence of AI, though, extends further than customary computers. It is equally crucial to excerpt useful data from large amounts of information. The Bank of America is an excellent instance of a bank, which introduced an AI-grounded scheme for better analysing and forecasting client behaviour. Having its AI-grounded, customer-centric characteristics, bank's computer-generated assistant Erica chatbot, which was launched in the year 2018, aims to impact the forthcoming of retail banking. The users may communicate by text, speech, or tap, creating a tri-mode approach able of supporting clients with activities for instance locating prior transactions, locking/unlocking debit cards, scheduling disbursements, making fund transmissions, and much more. As stated by the bank executives, Erica was able to grasp 200 thousand permutations of consumer enquiries at the time of debut. In less than twelve months, Erica's ability expanded to 500 thousand varieties. The bot is used by 7 million of the bank's 27 million clients by now (Streeter, 2018).

The clients are always looking for the best of two worlds: to advantage from human interface for complicated issues while also reaping the advantages of a digital knowledge, which gives them with ease and quickness. In keeping with Baumgärtner et al. (2018), Banks, which opt to enhance their operational models, transforming them to hybrid methods, may suppose a 15 per cent rise in profits and client satisfaction, as well as a 35 per cent reduction in total expenses. Instilling a digital approach into a conventional banking culture may be difficult and having to cope with both cultures at the same time might compound the problem. Achievement is dependent on involved top management that is dedicated to fundamentally reforming the bank (Baumgärtner et al., 2018).

Digital alteration is not limited to cutting-edge knowhows. This concerns putting technology to work by assisting clients with their financial journey and making their actions simpler. As an instance, mobile technology has possessed a significant influence in current times, owing to clients' desire to complete financial transactions by themselves; through many channels, benefiting from digital and tangible benefits. For the reason that the human aspect is critical to keeping and gratifying consumers, the omnichannel strategy keeps divisions existing in a largely digital age (El-Gohary et al., 2021).

Even though redefining function models is focused on what consumers want, it applies to how banks function internally as well. Each bank's digitalization journey will be exceptional, with distinct problems and specialised explanations for each organization. In the age of fast authorizations and one-click internet buying, the ordinary client has turned out to be impatient with opaque procedures, which require calendar weeks to complete. It all starts with comprehending the consumers and forecasting what they desire using new technologies such as Artificial Intelligence, Machine Learning (ML), and prognostic analytics, which are able to assist in replacing legacy-grounded structure having a contemporary, data-driven strategy. End-to-end process optimization is equally crucial since it supports control expenses whilst redesigning the client journey; and optimise operations through automation that increases responsiveness and velocity while removing waste (Perez-Vega et al., 2021).

With the aim of comprehending in which ways persons act as customers, it is imperative getting acquainted with the perception of customer behaviour and every aspect it is related to (Mooij, 2011). This is critical for marketers all over the globe to comprehend consumers' wants and behaviours with the intention of having a better understanding of in what ways they select to acquire goods and services. Customer behaviour is a broad notion having a lot of obvious elements impacting it, yet there is a concealed component as well that rests in the customer (Mooij & Hofstede, 2011). The commercial establishments ought to investigate all apparent elements impacting customer behaviour and scrutinize in what ways individuals select to perceive these marketing endeavours in order to determine if they are useful or not. Amid the several qualities impacting customer conduct, understanding the impact of culture on customer behaviour is critical (Leng & Botelho, 2010). Culture is the beating heart of any civilization, influencing individuals' demands, desires, and conduct. Each nation has its individual culture, which means that customer

behaviour differs by country. This indicates that individuals from various cultures possess varied procuring preferences; as an instance, an item or service that is greatly favoured in one culture may not be approached in the same way by different cultures (Mooij & Hofstede, 2011). Therefore, it is imperative to examine the customer behaviour by country, taking into consideration the specific sector of that country. For that reason, this study aims to study customer behaviour analysis with the implementation of AI at commercial banks operating in Azerbaijan.

When looking at the banking industry specifics of Azerbaijan, we can see that, at present, there are 26 banks functioning in the Republic of Azerbaijan, one of which is the Central Bank of Azerbaijan and the remaining 25 being commercial banks; Of the commercial banks, one is owned by the state, and the rest are privately owned ([Central Bank of Azerbaijan, 2022](#)). Digitalization of financial services are widely spread in the country, as the country administration is paying elevated attention to the expansion of the percentage of non-cash payments inside the country's economy (Talibov, 2020). Non-financial foundation scheme providers and electronic-money organizations, comprising telecom operatives, will be an important element of the payment network, according to article 3.4.4 of the State Program on Expansion of Digital Payments in the Republic of Azerbaijan. Contemporary payment processes for instance "mobile wallets" will be invented and utilised more regularly and readily when mobile carriers having a big client segment entering the payment industry. Additionally, payment service providers that have a considerable volume of payments data is progressively shifting in the path of mobile payments, creating their individual mobile wallets for addressing Z-generation and technologically progressed members of the populace. Furthermore, commercial banks are leveraging their collaboration with the PSPs in credit collection in distant places, that supports those individuals avoid secondary operation expenses and creates novel frontiers for PSPs. Nevertheless, notwithstanding the rise in the quantity of consumers utilizing online and non-cash payments, utilization of cash remains high in Azerbaijan, and the country administration is working hard to reduce this degree of cash utilization (Talibov, 2020). However, the use of AI-driven technologies at the commercial banks, and how the banks functioning in the country carries out customer behaviour analysis are the fields, which are not addressed in the existing literature.

3. RESULTS OF THE RESEARCH

This section outlines the outcomes of the original research, which consist of closed-end survey research and structured interviews.

3.1 Results of the Survey Research

This study comprises original research with the intention of answering formerly set research questions. Throughout March and April 2022, the original survey-based research was carried out amid the 125 Azerbaijani customers, who were asked 11 questions, in order to learn their insights regarding the bank service, digital bank tools and AI-driven applications.

The information about the age of the customers were gathered, with the aim of understanding which age groups are keen on digitalized and AI-driven technologies. The majority of the research partakers fall into 25-35 age group, as demonstrated by the graph below:

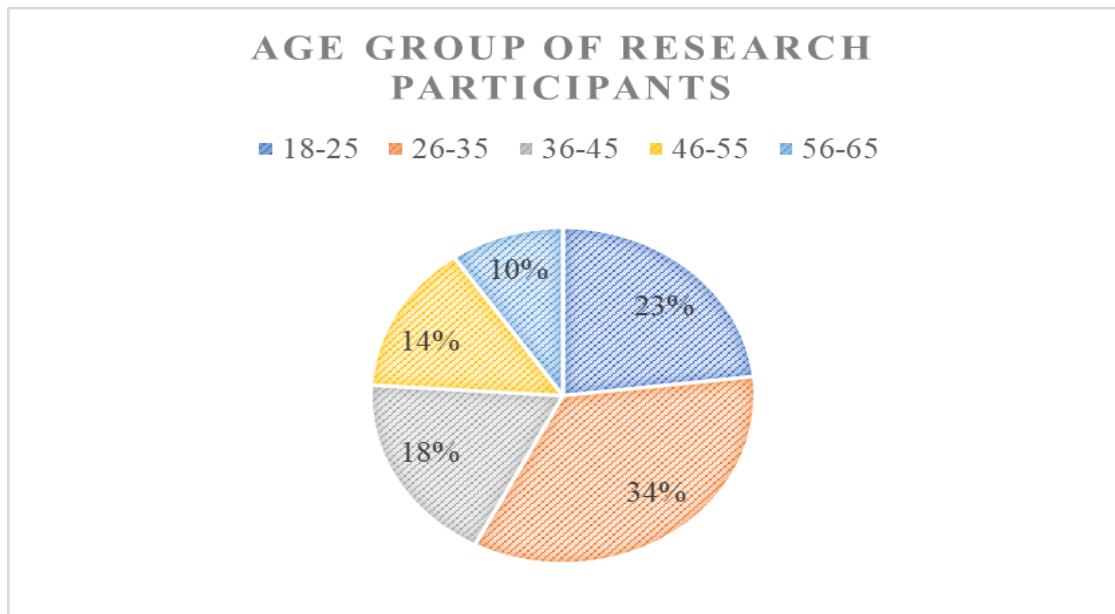


Figure 10: Age groups of survey respondents

In addition, the answers of the respondents analyzed using excel statistic tools in table 1.

1. Please select your age group

Mean	36.09677419
Standard Error	1.114093215
Median	33.5
Mode	25
Standard Deviation	12.406017
Sample Variance	153.9092578
Kurtosis	-0.651253214
Skewness	0.566974512
Range	47
Minimum	18
Maximum	65
Sum	4476
Count	124

Table 1: Survey outcomes: Age groups of survey respondents

The following question of the survey is about the monthly return of the respondents. As seen from table 2, the mean monthly income of the respondents is equal to 1 888 dollars. The calculated median and moda are equal to 1 840 and 1 500 dollars respectively. The standard deviation of the monthly income computed 681 dollars. It is a clear that the minimum and maximum income is analyzed were 600 and 3 262 dollars.

<i>2. What is your monthly income (with USD Dollars)?</i>	
Mean	1887.685484
Standard Error	61.1519728
Median	1840.5
Mode	1500
Standard Deviation	680.9595498
Sample Variance	463705.9084
Kurtosis	-0.947271188
Skewness	0.184591006
Range	2662
Minimum	600
Maximum	3262
Sum	234073
Count	125

Table 2: Survey outcomes: Frequency of utilizing banking services

The initial question to survey participants was how often they utilize banking services. Quite interestingly, the bigger part of the respondents (i.e., 41 participants) articulated that, they utilize banking services during regular payments. A close group of participants (i.e., 36 participants) indicated that, they utilize bank services 1-2 times a week, 29 respondents utilize these services 4-6 times a week and 19 out of 125 research participants make use of banking services on a daily basis. The respondents, who utilize banking services on a daily basis fall into the age group of 26-35. This question did not comprise specifications regarding traditional or online banking services, thus this is the inclusive banking service usage of Azerbaijani customers.

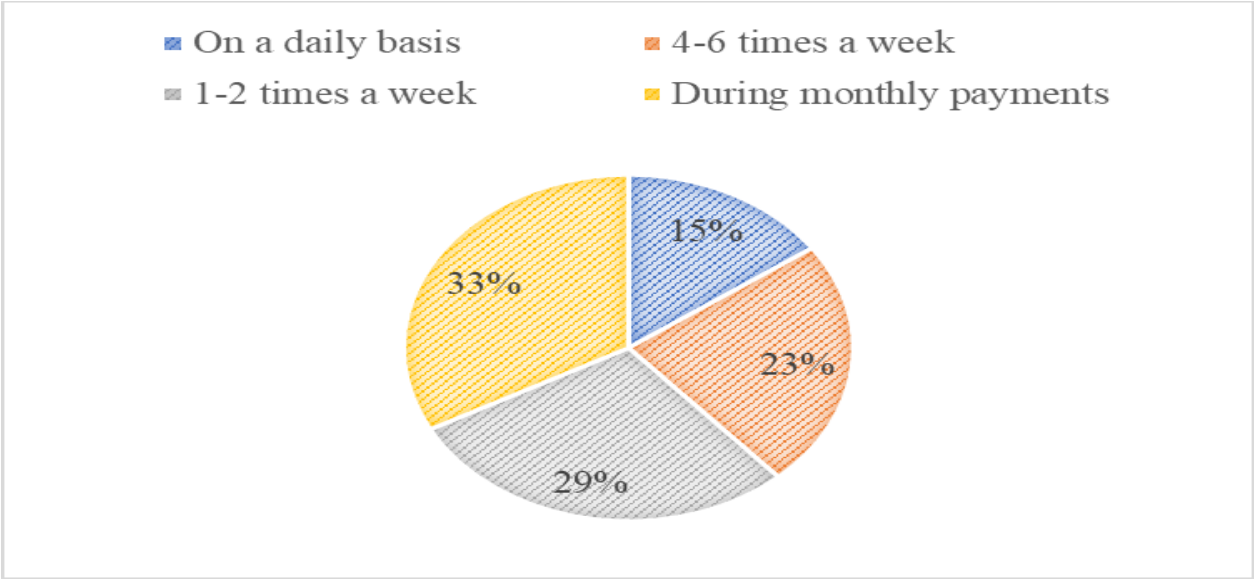


Figure 11: Survey outcomes: Frequency of utilizing banking services

When it comes to the online banking service utilization, fortuitously majority of the research contributors (63 percent, that is 79 individuals) indicated that, they utilize online services. 41 research partakers, which make the 33 per cent of the overall participants do not utilize online banking services, and 5 participants are not fully acquainted with the online banking services, as shown by the pie chart demonstrated on the Figure 12. When looking at the age group of the responds, it is seen that, of the 5 participants that are not familiar with the online banking facilities 4 belongs to the 56-65 age group, and 1 belongs to 18-25 age group. The majority of respondents, that belong to 26-35 and 36-45 age groups make the utilization of online banking.

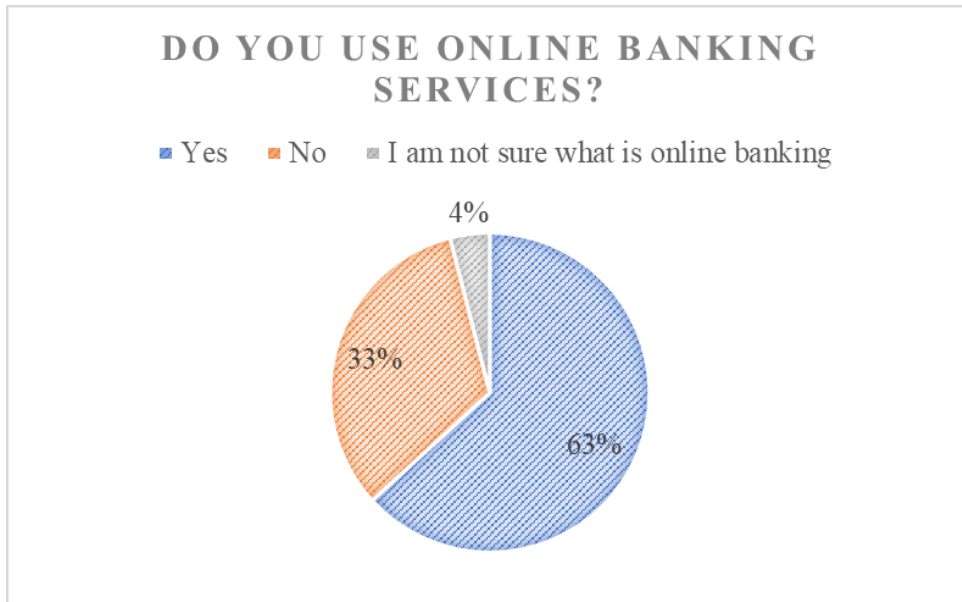


Figure 12: Survey outcomes: Portion of respondents utilizing online banking services

As online (or internet) banking can be accessed through solely using internet browsers, or e.g., applications of PSPs or banks on different devices, the respondents were asked if they actually have mobile banking apps on their phones and are actively (at present) utilizing them. Quite interestingly, the results are positive, since the bigger part of the respondents (i.e., 71 participants - 57 per cent of participants) utilize mobile banking apps on their phones. This can mean that, of the 79 respondents who utilize online banking services, 71 individuals (90 percent) prefer using mobile banking as an online banking tool. Moreover, 46 partakers, that is 37 per cent of the research participants do not have (do not use) mobile banking applications on their mobile devices. Remaining 8 research partakers stated that, they do not use a smart phone, in order to be able to utilize mobile banking apps (see Figure 13).

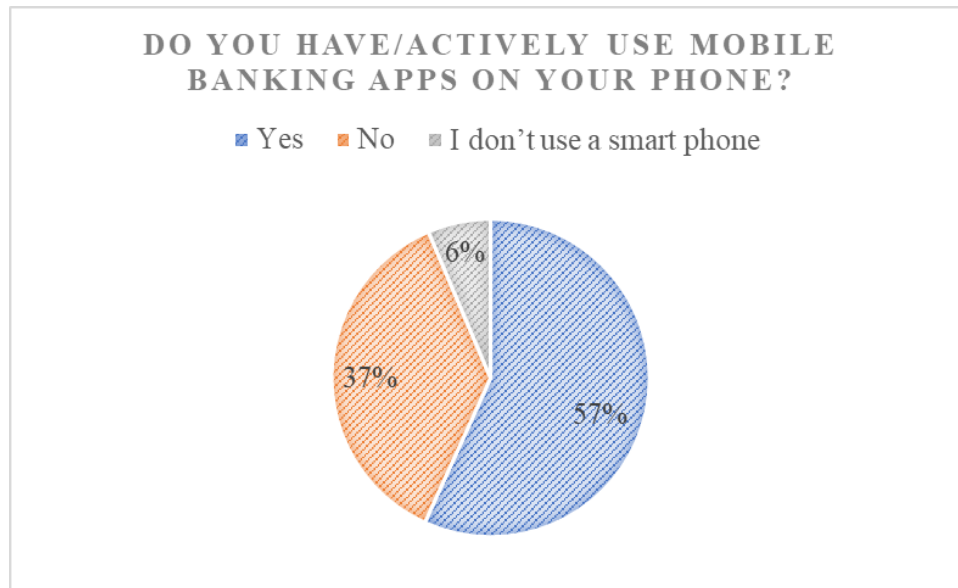


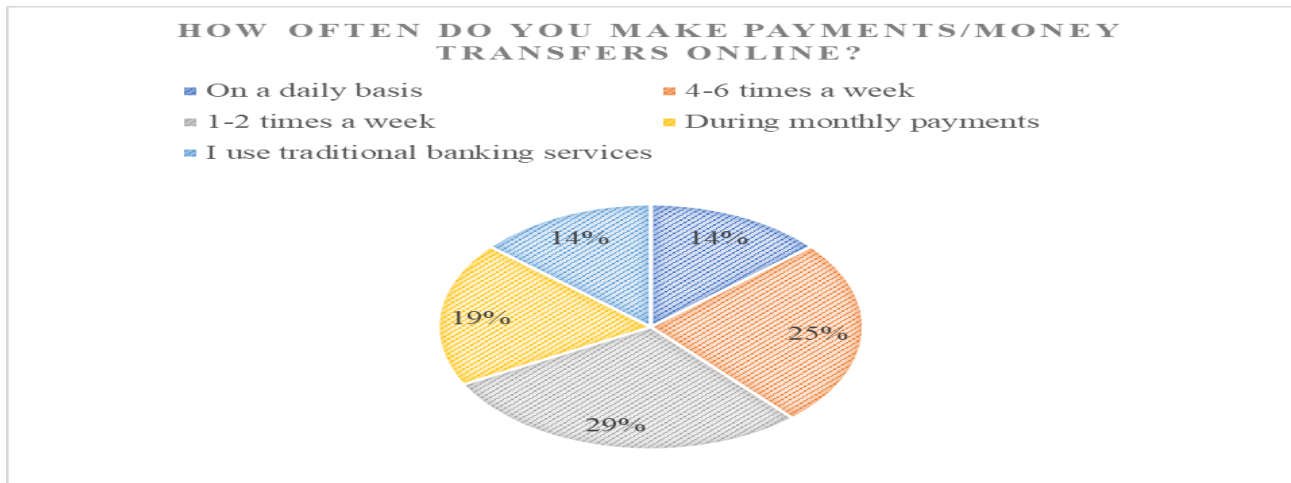
Figure 13: Survey outcomes: Usage of mobile banking applications amongst customers

The survey participants were how asked often they make payments/money transfers online in a week. Majority of them stated that they make online payments/money transfers 1-2 times and 4-5 times a week - 29 percent and 25 percent respectively. While 19 percent (24 individuals) utilize

online payment services once a month, 14 percent make payments/money transfers online daily, and interestingly, equal number of respondents prefer traditional banking services (Figure 14).

Figure 14: Survey outcomes: Frequency of making online payments/money transfers amongst customers in a week

The detailed descriptive statistic results for the noted questions illustrated in table 3. The



mean weekly payment transfers of the respondents is equal to 3. The respondents make payments or money transfers minimum 1 time and maximum 5 times in a week. The calculated standard deviation of the results is equal to 1.4 and the median is equal to 3.

5 How often do you make payments/money transfers online in a week\?

Mean	3.016129032
Standard Error	0.1269918
Median	3
Mode	2
Standard Deviation	1.414120836
Sample Variance	1.999737739
Kurtosis	-1.294532105
Skewness	-0.011402631
Range	4
Minimum	1
Maximum	5
Sum	374
Count	125

Table 3: Survey outcomes Frequency of making online payments/money transfers amongst customers in a week

The participants were asked about the bank products that they use more often, and the responds to this question displays that, Azerbaijani customers generally utilize bank loans more than other services, notwithstanding the fact that the answers were close to one another (Figure 15). Surprisingly, the least used services amid the survey partakers are deposits. The detailed responds to the question are as below:

- Loans (34 participants - 27%);
- Debit cards (27 participants - 22%);
- Making payments (23 participants - 18%);
- Credit cards (22 participants - 18%);
- Making money transfers (13 participants - 10%);
- Deposits - (6 participants - 5%).

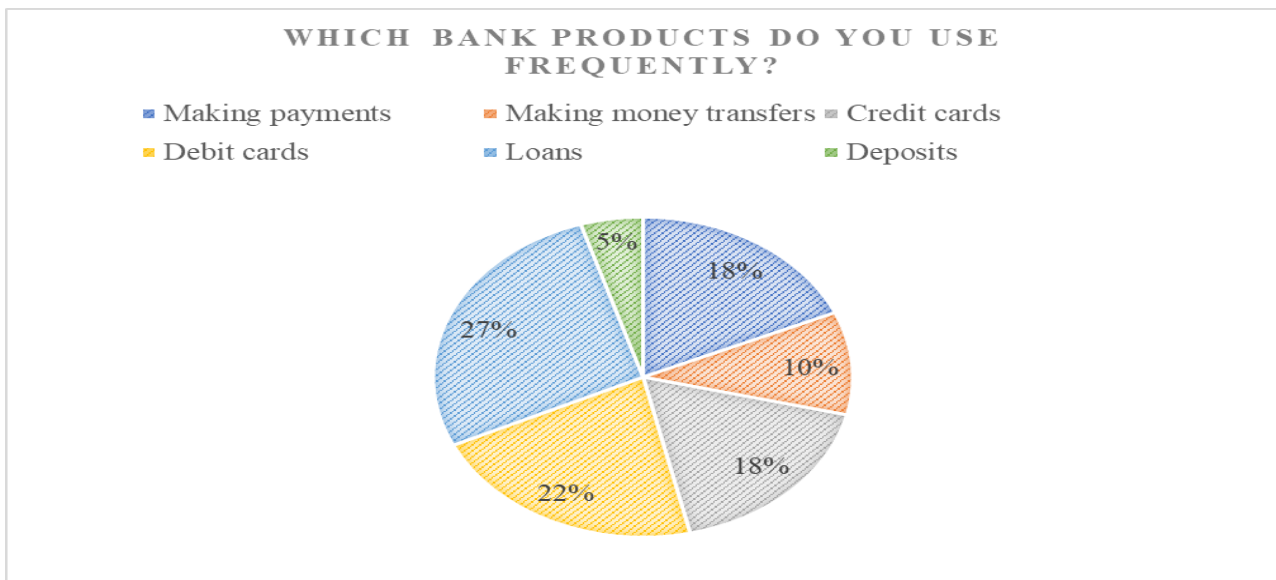
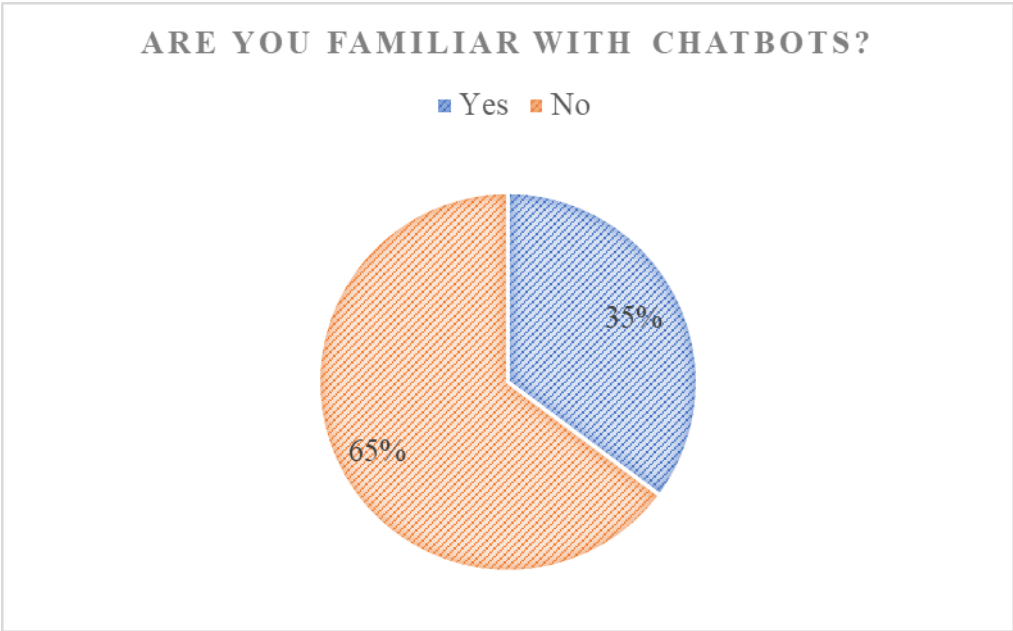


Figure 15: Survey outcomes: Frequently utilized bank products amongst customers

The bank customers taking part on the research were asked if they are familiar with chatbot, which is software assisting clients through automating conversations and communicate with them over messaging platforms. Quite surprisingly, bigger part of the participants are not acquainted

with the chatbots (Figure 16), despite the fact that the participants actually utilize online banking services and mobile banking applications.

Figure 16: Survey outcomes: Familiarity of participants with the chatbots

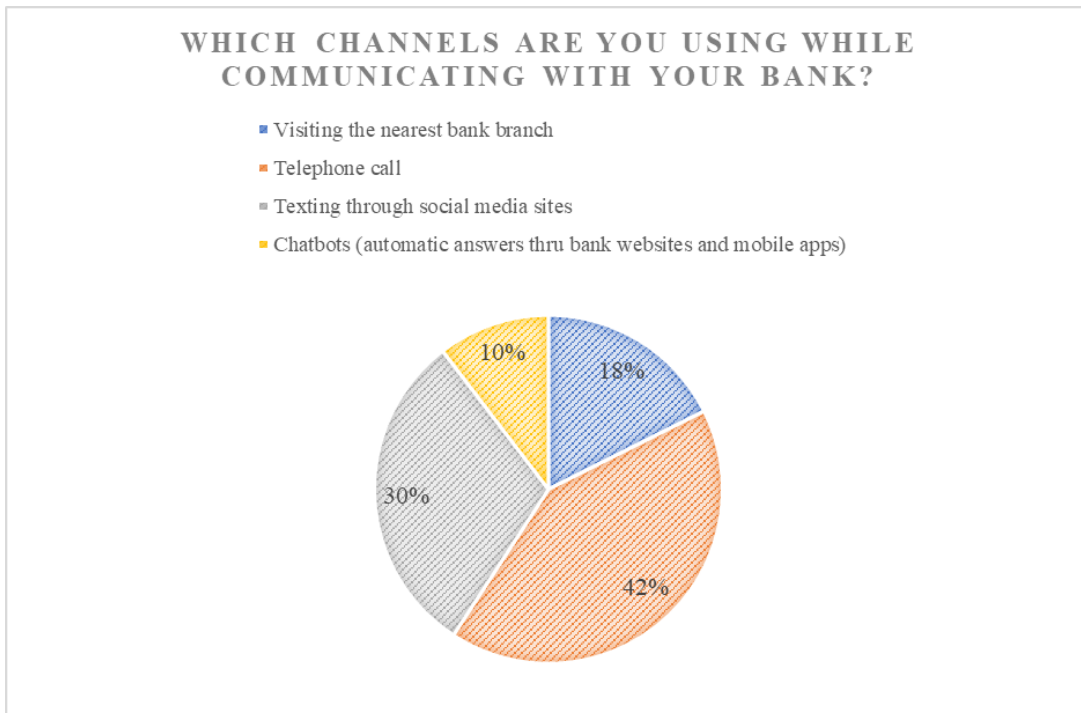


As the Azerbaijani customers, partaking in the research are generally not familiar with the chatbots, their communication channel with banks raises questions. The survey participants were asked about the channels they are using while communicating with their bank. Majority of the partakers (52 individuals - 42 percent) indicated that, they utilize telephone calls while communicating with their banks. 38 individuals (that is, 30 percent) prefer texting through social

media sites, 22 individuals (18 percent of total participants) visit the nearest bank branch, and only 13 individuals (10 percent) prefer chatbots (Figure 17).

Figure 17: Survey outcomes: Channels utilized by customers to communicate with banks

As mentioned earlier, the AI applications can be implemented through the utilization of social networks by the banks, e.g., in the face of targeted ads, data gathering, etc. Therefore, the research participants were asked whether they utilize social networking for communications with



the banks. Interestingly, half of the participants indicated that, they prefer other channels (such as, visiting bank branches, calling) while communicating with the banks. Another half utilize social media sites for communicating with the banks, however, 42 percent utilize this channel frequently, while 8 percent use this occasionally, when the other channels take more time than anticipated (Figure 18).

DO YOU USE SOCIAL NETWORKING FOR COMMUNICATIONS WITH YOUR BANK?

- Yes, I use social networking for bank communications frequently
- No, I prefer other channels (visiting bank branches, calling)
- I use occasionally when the other channels take more time

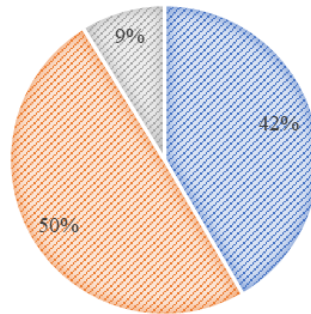


Figure 18: Survey outcomes: Usage of social networking amongst customers for bank communications

It is an obvious datum that, the banks are the organizations having vast amount of data about their customers, as mentioned on the literature review section. Banks can use traditional data analytics or AI-driven big data analytics for customer behaviour analysis. Another line of research indicates that, customers value personalization used by the commercial establishments. But what the customers think about using their data? With the aim of comprehending their insights, research participants were asked whether they would consent if commercial banks used their data for personalization purposes.

WOULD YOU CONSENT IF COMMERCIAL BANKS USED YOUR DATA FOR PERSONALIZATION PURPOSES?

- Yes
- No
- I am not sure what personalization is

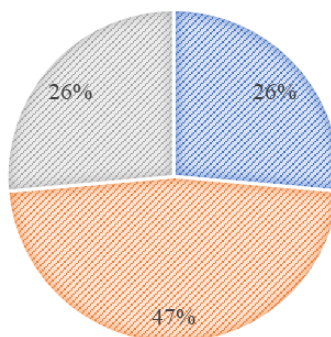


Figure 19: Survey outcomes: Customers' insights regarding the usage of their data for personalization purposes

As demonstrated by the Figure 19, almost half (47 percent) of the survey participants would not agree with the usage of their data for personalization purposes, which is a surprising fact. As highlighted by the existing literature research, customers all around the world generally prefer highly personalized services, which cannot be done deprived of customer data. This can be resulted by the differences in customer behaviour on the account of culture. 26 percent of the respondents would consent the usage of their data for personalization purposes, and surprisingly, equal part of the partakers is not acquainted with the idea of personalization.

WOULD YOU ENJOY THE COMPLETELY TECHNOLOGY-DRIVEN BANK SERVICES WITHOUT HUMAN INTERACTION?

- Yes, as long as the system works well and fast
- No, I prefer interaction with real person, while using bank services
- I would enjoy the balance of the two services

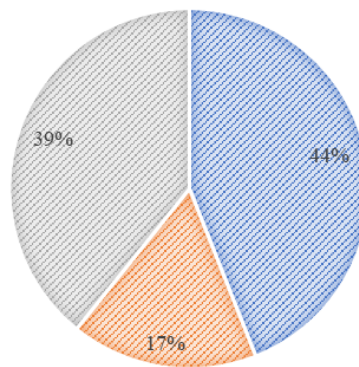


Figure 20: Survey outcomes: Would customers agree completely technology-driven bank services without human interaction?

As illustrated by the figure above, the survey participants were asked if they would enjoy the completely technology-driven bank services without human interaction. 55 participants (44 percent) indicated that, they would agree, as long as the system works well and fast. In contrast, 21 participants (17 percent), prefer interaction with real persons while using bank services. The bigger of the participants prefer the balance of the two worlds: the completely tech-driven services, and proper interactions with bank representatives. The responds to this question display that, although some Azerbaijani customers would rather have traditional banking experience, there are tech-savvy young and middle-aged customers as a majority, which would allow banks utilize sophisticated applications enabled by technology, mainly Artificial Intelligence and ML.

In our survey we touch 2 variables which has a big effect on customer behaviour in banking sector. They are their age and their monthly income. We can analyse the relationships between these variables with using regression analysis tools. Firstly, we will identify relationship between respondents' age group and their banking services usage frequency. We will use Excel's regressions tool for analysis. In this research dependent variables or Y range is banking services usage frequency and independent variables or Y range is customers' age. will identified confidence level as 99%. The results are illustrated below:

<i>Regression Statistics</i>	
Multiple R	0.747593356
R Square	0.558895825
Adjusted R Square	0.555309613
Standard Error	0.882177345
Observations	125

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	121.2849	121.2849	155.8457	1.31529E-23
Residual	123	95.72313	0.778237		
Total	124	217.008			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	6.4	0.242006	26.44589	5.921	6.879108	5.921035	6.879
X Variable 1	-0.079	0.006302	-12.4838	-0.0912	-0.0662	-0.09115	-0.0662

Table 4: Summary output for relationships between between respondents' age group and their banking services usage frequency

As seen in table 4, multiple R is close to 1 (0.74) and it means that there is a strong negative and linear relationship between two variables (respondents' age group and their banking services usage frequency). On the other hand, the coefficient of determination (R squared) is equal to 0.55 and it means that about 55 % of the variables from the Y ranges are suitable for the model. The standard error for this regression analysing model is equal to 0.88. So, the linear regression equation is following:

$$Y = 6.4 X_1 - 0.079 X_2$$

If we analyse correlation between respondents' monthly income and their banking services usage frequency, we can do it with the same way with excel regression tools. The result illustrated at the below:

<i>Regression Statistics</i>	
Multiple R	0.340345692
R Square	0.11583519
Adjusted R Square	0.108646858
Standard Error	1.248969777
Observations	125

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	25.13716	25.13716	16.11434	0.000102943
Residual	123	191.8708	1.559926		
Total	124	217.008			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	4.79	0.329827	14.52205	4.137	5.442628	4.136885	5.442628
X Variable 1	-0.001	0.000164	-4.01427	-0.001	-0.00033	-0.00098	-0.00033

Table 5: Summary output for relationships between respondents' monthly income and their banking services usage frequency

As seen in table 5, multiple R is close to 0 (0.34) and it means that there is a weak negative and linear relationship between two variables (respondents' monthly income and their banking services usage frequency). On the other hand, the coefficient of determination (R squared) is equal to 0.11 and it means that about 11% of the variables from the Y ranges are suitable for the model. The standard error for this regression analysing model is equal to 1.24. So, the linear regression equation is following:

$$Y = 4.79 X_1 - 0.001 X_2$$

To conduct hypotheses, we should calculate population means of the different variables such as respondents' monthly income and their age group first. We use Excel Average function to compute population means for each variable.

Hypothesis 1. It is a fact that, consumer age factor has a big effect on consumer behaviour. We can assume that the age of the participants participating in the survey is over 30 years old. So, the hypothesis and alternative hypotheses can be expressed as follows:

Null hypothesis:

$$H_0: \mu = 36$$

Alternative hypothesis:

$$H_1: \mu \neq 36$$

In our case, significance level α is 0.05 or 5%. We will use the t-test to check the validity of the hypothesis and determine the acceptance area. The mentioned tests were performed using EViews software. The results are illustrated at the following table.

Hypothesis Testing for AGE		
Date: 08/23/22 Time: 11:39		
Sample: 1 125		
Included observations: 125		
Test of Hypothesis: Mean = 36.00000		
Assuming Std. Dev. = 12.50000		
<hr/>		
Sample Mean = 36.30400		
Sample Std. Dev. = 12.57123		
<hr/>		
<u>Method</u>	<u>Value</u>	<u>Probability</u>
Z-statistic	0.271906	0.7857
t-statistic	0.270365	0.7873
<hr/>		

Table 6. z-test result for hypothesis 1

As standard deviation is known we can use z-statistics test. As seen from the results illustrated above, the value of Z-statistics is above on 0.025 and it prove the truth of the null hypothesis.

Hypothesis 2. Another important factor which has a big effect on consumer behaviour is their income level. As the result of survey, we can assume that the average income level of the participants is over 1890 USD dollars. So, the hypothesis and alternative hypotheses can be expressed as follows:

Null hypothesis:

$$H_0: \mu = 1890$$

Alternative hypothesis:

$$H_1: \mu \neq 1890$$

In our case, significance level α is 0.05 or 5%. We will use the t-test to check the validity of the hypothesis and determine the acceptance area. The mentioned tests were performed using Eviews software. The results are illustrated at the following table.

Hypothesis Testing for MONTHLY
 Date: 08/23/22 Time: 12:00
 Sample: 1 125
 Included observations: 125
 Test of Hypothesis: Mean = 1890.000

Sample Mean = 1896.584
 Sample Std. Dev. = 685.4665

<u>Method</u>	<u>Value</u>	<u>Probability</u>
t-statistic	0.107389	0.9147

Table 7. t-test result for hypothesis 1

We can use t-statistics test for checking hypothesis. As seen from the results illustrated above, the value of t-statistics is above on 0.05 (0.11) and it prove the truth of the null hypothesis.

Hypothesis 3. In this case we want to analyse two factors effect on consumer behaviour at the same time. For this, we will use f-statistics. Two factors are the age and income level of respondents. As the result of survey, we can assume that the respondents whose income is more 1890 USD dollars and 36 years older use online banking service more frequently.

Null hypothesis:

$$H_0 : \sigma_1^2 = \sigma_2^2,$$

Alternative hypothesis:

$$H_0 : \sigma_1^2 \neq \sigma_2^2,$$

In our case, significance level α is 0.05 or 5%. We will use the f-test to check the validity of the hypothesis and determine the acceptance area. The mentioned tests were performed using Eviews software. The results are illustrated at the following table.

Dependent Variable: USAGE FREQUENCY
 Method: Least Squares
 Date: 08/23/22 Time: 12:29
 Sample: 1 125
 Included observations: 125

Variable	Coefficien...	Std. Error	t-Statistic	Prob.
C	2.856067	0.447523	6.381951	0.0000
AGE	0.007078	0.011092	0.638094	0.5246
MONTHLY	-5.11E-05	0.000203	-0.251452	0.8019
R-squared	0.003327	Mean dependent var		3.016000
Adjusted R-squared	-0.013012	S.D. dependent var		1.408408
S.E. of regression	1.417541	Akaike info criterion		3.559432
Sum squared resid	245.1496	Schwarz criterion		3.627312
Log likelihood	-219.4645	Hannan-Quinn criter.		3.587008
F-statistic	0.203630	Durbin-Watson stat		1.952178
Prob(F-statistic)	0.816041			

Table 8. f-test result for hypothesis 3

As seen from the results illustrated above, the value of f-statistics is above on 0.05 (0.11) and it prove the truth of the null hypothesis.

3.2 Results of the Interview Research

This study takes in the structured online interviews with the 7 senior IT specialists of 7 large commercial banks operating in Azerbaijan. The interviewees were selected and contacted through the professional platform, and the online interviews were carried out using video communication application. Since the interviews were structured, each interviewing process took approximately 12 minutes. With the aim of respecting confidentiality as the basis of research ethics, the names of the interviewees and their organizations will not be shared. Equally, the principle of reliability and trustworthiness is highly respected as the core concepts of research ethics, thus the collected information will not be altered, and will be presented as gathered.

Of the interviewed 7 commercial banks, all of them possess internet banking services and mobile banking applications. All the banks actively utilize social networking sites for targeting customers. The 5 out of 7 interviewed banks utilize chatbots. The interviewees were asked about the purposes/motives of them behind the utilization of AI and/or ML-centric applications. They could select one or multiple, amongst the provided 7 choices. The results (answers) of this question are illustrated by the below figure:

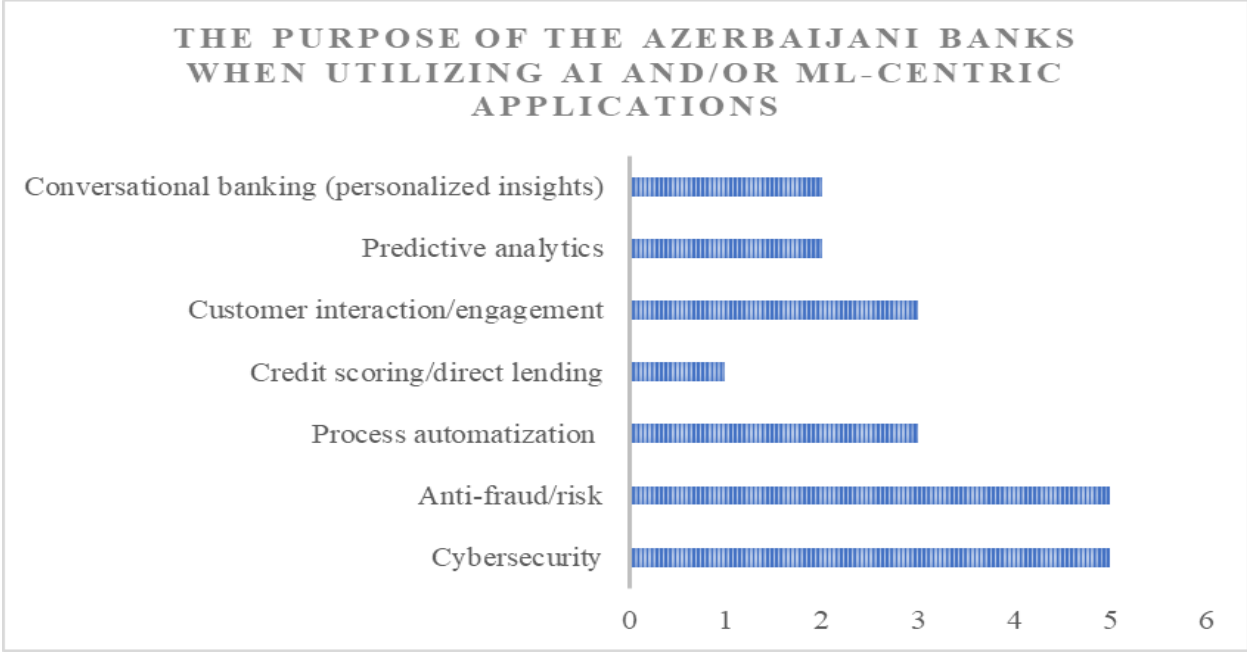


Figure 21: Interview outcomes: The purpose of the banks while utilizing AI and/or ML-centric applications

When asked if they carry out customer behaviour analysis, all the interviewees stated that their banks carry out customer behaviour analysis. 3 banks carry out the customer behaviour analysis procedure on a monthly basis, while 4 of them execute the analysis quarterly. These banks were asked about the ways your customer behaviour analysis is implemented. While 4 of them carry out customer behaviour analysis through conventional ways using customer data, 3 of them execute this analysis over the utilization of cutting-edge technologies, such as big data analytics, AI, ML, deep learning, etc. The banks were asked whether they are planning to further digitalize their operations in the next twelve months. All of the 7 banks indicated that, they are looking forward to further digitalize their operations in the forthcoming future, while 5 of them have clear plans on the digitalization in the coming twelve months, and 2 of them have not planned the process in detail.

The interview research procedure indicates positive outcomes, indicating that the commercial banks operating in Azerbaijan are keen on utilizing the digitalized tools and sophisticated technologies, some of them integrating artificial intelligence and machine learning to their operations. However, the implementation of these sophisticated applications is not

customer centric, as banks generally utilize AI and ML for cybersecurity, anti-fraud and risk management purposes, which is aimed at the quality of internal procedures. Only 3/7 banks utilize AI-driven technologies for customer interaction/engagement purpose and 2/7 utilize them for conversational banking (that is, personalized insights). This proves that there is still room in the commercial banking industry of Azerbaijan for further advancement: digitalization, utilization of AI-powered technologies and penetration/adjustment of these technologies for the customer-centric objectives. With regard to carrying out customer behaviour analysis, majority of the banks carry out this procedure quarterly, and utilize conventional banking customer behaviour analysis. However, quite positively, large banks carry out this procedure frequently, and make use of sophisticated applications.

4. CONCLUSIONS

This research was aimed to examine the customer behaviour analysis with artificial intelligence implementation at the banks functioning in Azerbaijan. In doing so, this research explored the existing literature on the AI and banking sector, analysed the AI implementations of the banks operating in Azerbaijan, and studied the ways customers react to these implementations.

The technological disruption is redefining the industries and altering the way commercial establishments operate, and each are of business is evaluating selections and implementing ways to create value in the technology-powered world. Since we entered the 4th industrial revolution, artificial intelligence (AI) and machine-learning (ML) know-hows are powering business automation in progressively more fields, from scheming optimum transport loads to sifting loan applicants short of the human contribution. One of the foremost industries being impacted by these alterations is banking segment, which is experiencing revolutionary vicissitudes, the most imperative of them being the upsurge in customer centeredness. AI technologies are having an increasingly visible influence on our lives, from instant conversion to colloquial interfaces, which is especially true in the financial services industry, in which challengers are by now developing upsetting AI-based solutions. For staying competitive, incumbent banks should drive being “AI first” in approach and implementation, which means altering the complete capacity load, together with the engagement level, AI-driven decision-making process, fundamental technology and information infrastructure, and operation paradigm. These competences, when copiously combined, possess the prospect to substantially enhance engagement through supporting clients’ financial activities crossways miscellaneous online and physical frameworks having intelligent, vastly personalized solutions brought through an interface, which is innate, seamless, and speedy - these are the criterion outlooks for an AI bank.

Customers are requesting increased control on their operations, improved arrangement, and anytime, anywhere accessibility as banking moves away from physical branches and toward implementations and alert protected sites on mobile appliances. Commercial banks should rethink their corporate standards or face extinction in the novel marketplace situation. In doing so, the banks must place customer behaviour analysis at the centre of each operation they carry out. For years, the banking commercial model has been lacking in terms of customer involvement and

distinction. Clients had no selection yet entrusting their finances to banking establishments, and banks took advantage of a high degree of faithfulness. However, recent financial crises, gradually strict guidelines, digital interference, and the advent of FinTech's and knowledge behemoths have all possessed a significant influence on the segment. Considering the fact that majority of further sectors have implemented novel technologies such as cloud mobility, IoT and AI-driven applications for delivering hyper personalized services regardless of place and time. Retailers, as an instance, provide omnichannel practises as well as greatly tailored offers and facilities. Clienteles are at present requesting the identical degree of engagement, access, simplicity of commerce and insight from their banks. In our time, the clients are examining conventional banking models, and requiring not solely on-demand admission and superior management thru their operations but also improved involvement.

Customer reliability and confidence are two important guiding elements in the banking industry. At this point, as conventional banks work to accelerate their digital changeover, they should begin by placing the consumer at the centre of all their plans. Fundamentally, each digital strategy has to comprehend two important concepts. Initially, considering what clients want, and then considering their banking habits. Clients today expect a smooth and simple banking practice. Customers want being capable of opening their accounts whenever and whenever they want to, and they do not inevitably wish to go to a bank location for their operations. Banks might provide facilities to clients on request through financing in a complete approach, which includes cloud, mobility, and contemporary apps. Through successfully examining customer behaviour, commercial banks might form a holistic image of a behaviour of a customer, the form of operations they perform, what platforms or means they choose, their payment conducts, their reserve patterns and so forth. This information is a genuine goldmine aimed at an establishment making efforts to unite with their clients in novel and ground-breaking means. Customer behaviour carries the key to contemporary banking, from hyper-personalizing services for developing more specific and appropriate marketing initiatives. The commercial banks can even utilize customer behaviour analysis with the intention of forming novel business models.

The survey research demonstrated that, the banking service customers of Azerbaijan are familiar with internet/online banking and mobile banking applications, and they utilize varied channels with the aim of communicating with their banks. Bigger part of these customers utilize

social networks, and other non-traditional channels while interacting with the banks. Although some Azerbaijani customers would rather have traditional banking experience, in keeping with the survey outcomes, there are tech-savvy young and middle-aged customers as a majority, which would allow banks utilize sophisticated applications enabled by technology, mainly Artificial Intelligence and ML.

The interview research procedure revealed positive outcomes, indicating that the commercial banks operating in Azerbaijan are keen on utilizing the digitalized tools and sophisticated technologies, some of them integrating artificial intelligence and machine learning to their operations. However, the implementation of these sophisticated applications is not customer centric, as banks generally utilize AI and ML for cybersecurity, anti-fraud and risk management purposes, which is aimed at the quality of internal procedures. A few banks utilize AI-driven technologies for customer interaction/engagement purpose and a small portion of them utilize them for conversational banking (that is, personalized insights). This proves that there is still room in the commercial banking industry of Azerbaijan for further advancement: digitalization, utilization of AI-powered technologies and penetration/adjustment of these technologies for the customer-centric objectives. With regard to carrying out customer behaviour analysis, majority of the banks carry out this procedure quarterly, and utilize conventional banking customer behaviour analysis. However, quite positively, large banks carry out this procedure frequently, and make use of sophisticated applications.

As a result of the statistical analysis, the following conclusions were reached:

1. The average age of the respondent is 36 years old.
2. The average salary of the respondent is 1890 USD dollars.
3. Consumers' age and income have a major impact on consumers' choices to use online banking services.

In addition these three hypothesis in our research we assume that, there is a relationship between respondent's age group and their banking services usage frequency. As a result of regression analysis, it was clear that there is a strong negative relationship between these two factors. So, as the age level of respondent's age increase, their preference on online banking service usage will decrease. It illustrates that young people are more inclined to use online banking services. Moreover, in this research we investigated

the relationship between respondent's monthly salary and their preference on online banking service preference. The results highlight that, there is a weak positive linear relationship between these two factors.

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APPENDICES

Appendix A: Survey Questions

1. Please select your age group:
 - 18-25
 - 26-35
 - 36-45
 - 46-55
 - 56-65
2. How often do you use banking services?
 - On a daily basis
 - 4-6 times a week
 - 1-2 times a week
 - During monthly payments
3. Do you use online banking services?
 - Yes
 - No
 - I am not sure what is online banking
4. Do you have mobile banking apps on your phone?
 - Yes
 - No
 - I don't use a smart phone
5. How often do you make payments/money transfers online?
 - On a daily basis
 - 4-6 times a week
 - 1-2 times a week
 - During monthly payments
 - I use traditional banking services
6. Which bank products do you utilize frequently?
 - Making payments

- Making money transfers
 - Credit cards
 - Debit cards
 - Loans
 - Deposits
7. Are you familiar with chatbots?
- Yes
 - No
8. Which channels are you using while communicating with your bank?
- Visiting the nearest bank branch
 - Telephone call
 - Texting through social media sites

 - Chatbots (automatic answers thru social networking apps and mobile apps)
9. Do you use social networking for communications with your bank?
- Yes, I use social networking for bank communications frequently
 - No, I prefer other channels (visiting bank branches, calling)
 - I use occasionally when the other channels take more time
10. Would you consent if commercial banks used your data for personalization purposes?
- Yes
 - No
 - I am not sure what personalization is
11. Would you enjoy the completely technology-driven bank services without human interaction?
- Yes, as long as the system works well and fast
 - No, I prefer interaction with real person, while using bank services
 - I would enjoy the balance of the two services

Appendix B: Structured interview questions

1. Does your bank possess an online (or internet) banking service?
 - Yes
 - No
2. Does your bank possess mobile banking service?
 - Yes
 - No
3. Does your bank actively utilize social networking sites for targeting customers?
 - Yes
 - No
4. Do your operations include AI and/or ML-driven applications?
 - Yes
 - No
5. If yes, what is the purpose of the utilizing AI and/or ML-centric applications? (chose one or multiple)
 - Cybersecurity
 - Anti-fraud/risk
 - Process automatization
 - Credit scoring/direct lending
 - Customer interaction/engagement
 - Predictive analytics
 - Conversational banking (personalized insights)
6. Are you currently utilizing chatbots (Customer service/engagement)?
 - Yes
 - No
7. Do you carry out customer behaviour analysis?
 - Yes
 - No
8. If yes, how often do you execute such analysis?

- Once a month
 - Quarterly
 - Semi-annually
 - Annually
9. In what ways your customer behaviour analysis is implemented?
- Through conventional ways using customer data
 - Through cutting-edge technologies
10. Are you planning to further digitalize your operations in the next twelve months?
- Yes, we have clear plans on the digitalization
 - Yes, but we have not planned the process in detail
 - Not in the foreseeable future