ASSOCIAÇÃO DE POLITÉCNICOS DO NORTE **(APNOR)**

INSTITUTO POLITÉCNICO DE BRAGANÇA

Business Intelligence as a Catalyst for Digital Transformation

In the Banking System of Georgia

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Final Dissertation submitted to *Instituto Politécnico de Bragança*

To obtain the Master Degree in Management, Specialisation in Business Management

Supervisors:

Luís Carlos Magalhães Pires (PhD)

Venera Tsertsvadze (PhD)

***Bragança*, June, 2025.**

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Abstract

Business Intelligence (BI) has become essential in the digital transformation journey in the modern era. Different industries are adopting BI to leverage data for strategic decision-making processes. BI tools help organizations optimize and automate workflows, enhance productivity, and forecast future trends based on data insights. Especially in the banking sector, which has experienced digital transformation for the last several decades, business intelligence takes a catalytic role in this process, helping organizations transition from legacy systems to modern, efficient processes, which are the demands of a competitive, technology-driven market.

This study explores the adoption of Business Intelligence systems and enables digital transformation in the banking sector of Georgia. This study addresses the primary question: How do BI tools drive digital transformation in the banking sector? This includes examining organizations' challenges and the benefits achieved by traditional and modern BI systems in delivering actionable insights and supporting rapid decision-making.

In the process, another focus will be one of the biggest challenges in real-world company cases. The study also highlights critical success factors and best practices for integrating Business Intelligence (BI) as part of the digital transformation journey, focusing on BI's impact on productivity, cost efficiency, and management’s decision-making. Additionally, by focusing on real-world case studies and industry perspectives, this research aims to gain a deeper understanding of BI’s role in fostering organizational resilience, agility, and competitive advantage.

Keywords: Business Intelligence, digital transformation, banking sector, agility, catalyst.

Resumo

A Inteligência de Negócios (Business Intelligence – BI) tornou-se essencial na jornada de transformação digital na era moderna. Diversos setores vêm adotando o BI para utilizar dados no processo de tomada de decisões estratégicas. As ferramentas de BI auxiliam as organizações na otimização e automação de fluxos de trabalho, no aumento da produtividade e na previsão de tendências futuras com base em insights extraídos de dados. Especialmente no setor bancário, que tem passado por transformações digitais ao longo das últimas décadas, a inteligência de negócios exerce um papel catalisador nesse processo, apoiando a transição de sistemas legados para processos modernos e eficientes, em resposta às exigências de um mercado competitivo e impulsionado pela tecnologia.

Este estudo investiga a adoção de sistemas de Business Intelligence e sua contribuição para a transformação digital no setor bancário da Geórgia. A pesquisa busca responder à seguinte questão principal: como as ferramentas de BI impulsionam a transformação digital no setor bancário? Isso inclui a análise dos desafios enfrentados pelas organizações, bem como os benefícios alcançados com a utilização de sistemas tradicionais e modernos de BI na geração de insights acionáveis e no apoio à tomada de decisões rápidas.

Adicionalmente, o estudo aborda um dos maiores desafios observados em casos reais de empresas. Serão destacados fatores críticos de sucesso e boas práticas para a integração do BI como parte da jornada de transformação digital, com ênfase no impacto do BI sobre a produtividade, a eficiência de custos e a tomada de decisões gerenciais. Ao concentrar-se em estudos de caso e perspectivas do setor, esta pesquisa visa aprofundar a compreensão do papel do BI na promoção da resiliência organizacional, agilidade e vantagem competitiva.

Palavras-chave: Inteligência de Negócios, transformação digital, setor bancário, agilidade, catalisador.

აბსტრაქტი

Business Intelligence – BI თანამედროვე ეპოქაში ციფრული ტრანსფორმაციის პროცესის განუყოფელ ნაწილად იქცა. სხვადასხვა ინდუსტრიაში გამოიყენება BI, რათა მონაცემებზე დაფუძნებული სტრატეგიული გადაწყვეტილებების მიღება გახდეს შესაძლებელი. BI ხელს უწყობს ორგანიზაციებს ოპერაციების ოპტიმიზაციას, ავტომატიზაციას, პროდუქტიულობის გაზრდასა და მომავალი ტენდენციების პროგნოზირებას მონაცემთა ანალიზის საფუძველზე. განსაკუთრებით საბანკო სისტემაში, რომელიც ბოლო წლებია აქტიურად განიცდის დიჯითალიზაციის პროცესს, BI თამაშობს ერთ-ერთ მნიშვნელოვან როლს, რაც ორგანიზაციებს ეხმარება ძველი სისტემებიდან თანამედროვე და ეფექტურ პროცესებზე გადასვლაში.

ეს კვლევა მიზნად ისახავს Business Intelligence სისტემების დანერგვის შესწავლას და იმას, თუ როგორ უწყობს ხელს BI ციფრულ ტრანსფორმაციას ქართულ საბანკო სისტემაში. კვლევის მთავარი შეკითხვაა: როგორ უწყობს ხელს BI ციფრულ ტრანსფორმაციას საქართველოს საბანკო სფეროში? ამ პროცესში შეფასდება ორგანიზაციების წინაშე არსებული გამოწვევები და BI სისტემებისგან მიღებული სარგებელი. კვლევა მოიცავს ორგანიზაციების წინაშე არსებული გამოწვევებისა და ტრადიციული თუ თანამედროვე BI სისტემების მიერ მიღწეული სარგებლის შესწავლას, რაც უკავშირდება ქმედითი ანალიტიკისა და სწრაფი გადაწყვეტილებების მიღების მხარდაჭერას.

კველვაში ყურადღება დაეთმობა საუკეთესო პრაქტიკებს BI-ის ციფრული ტრანსფორმაციის ინტეგრაციის გზაზე, განსაკუთრებით კი BI-ის გავლენას პროდუქტიულობაზე, ხარჯების ეფექტურობაზე და მენეჯმენტის გადაწყვეტილების მიღების პროცესზე. კვლევა მიზნად ისახავს BI-ის როლის უკეთ გაცნობას ორგანიზაციული გამძლეობის, მოქნილობისა და კონკურენტული უპირატესობის განვითარების კუთხით.

საკვანძო ტერმინები: ბიზნეს ინტელექტი, ციფრული ტრანსფორმაცია, საბანკო სექტორი, კატალიზატორი.

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Acronyms

AI: Artificial Intelligence

BI: Business Intelligence

BNPL: Buy Now Pay Later

BOG: Bank of Georgia

IT: Information Technology

MAU: Monthly Active Users

ML: Machine Learning

OLAP: Online Analytical Processing

PFM: Personal Financial Management

SME: Small and Medium Enterprise

SQL: Structured Query Language

TCO: Total Cost of Ownership

TOE: Technology-Organization-Environment

UX: User ExperienceBI: Business Intelligence

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Introduction

In the modern digital world, data-driven strategies for organizations are rapidly becoming a prerequisite for competitiveness, operational efficiency, and strategic flexibility. Digital transformation is not only a technological innovation anymore, but it is also a strategic necessity to be competitive in the market. Digital transformation can optimize processes, improve decision-making, and drive innovation in financial services (Xu et al., 2023). This process requires the integration of digital technologies at every level of the company. Among these technologies, Business Intelligence (BI) has emerged as a fundamental enabler, helping organizations.

Business intelligence is interpreted differently by many authors. The most common understanding of Business intelligence is that this discipline combines business analytics, data mining, data visualization, data reporting, data tools, infrastructure, and best practices to empower organizations to make more data-driven decisions (Gurcan, Ayaz, Dalveren, & Derawi, 2023). This definition underlines the multifaceted nature of BI, which integrates several tools and methodologies to support the processes that lead to decision-making outputs.

Therefore, the banking sector is known for the sensitivity of data. This reason reinforces the necessity and the role of business intelligence in this sector. The banking sector in Georgia is recognized for its stability, resilience, and strong regulatory oversight, which has contributed to sustained growth and public trust over the past decade. The increasing stability of the Georgian banking system is also indicated by the increase in share prices of two Georgian banks listed on the London Stock Exchange – TBC Bank and Bank of Georgia. Bank of Georgia has been listed on the London Stock Exchange since 2012, and TBC Bank since 2016 (TBC, 2024). Given the strategic importance of Georgian leading banks to the national economy and the advantages of digital transformation in the banking sector, the Georgian banks represent an ideal context for examining the role of Business Intelligence (BI) as a driver of digital transformation.

Digitally born companies form their infrastructure based on business intelligence tools. However, traditional industries like the banking sector, especially those from a different century, have to initiate the process of digital transformation. This process has many barriers. These include outdated infrastructure, lack of technical capabilities, resistance to change, and fragmented data structures (Diener & Špaček, 2021). In these circumstances, implementing BI is no longer just a technological upgrade — it is a strategic step towards digital maturity.

Implementing BI systems has many difficulties—the most popular question is choosing between system integration of SQL-based on-premise versions or cloud-based, artificial intelligence-enhanced platforms. Additional issues are data governance policies and employee and user training.

This study explores how do business intelligence tools facilitate the digital transformation process in the banking system of Georgia. Understanding if Business Intelligence is a core part of digital transformation. The following sub-issues will be discussed within the framework of the study:

- What are the strategic and operational benefits organizations, particularly in the banking sector, derive from implementing Business Intelligence (BI) tools, and how do these benefits align with the broader objectives of digital transformation?
- What are the critical organizational, technical, and cultural challenges associated with implementing BI systems in banks, and how do these challenges?
- In what ways does the deployment of BI systems enhance an organization's agility, data-driven decision-making capability, and productivity in the context of digital transformation in the banking sector?

To explore the research questions, this study employs a survey approach that combines quantitative, qualitative, and methodologies. Quantitative data will be collected through surveys administered to professionals working with BI tools in the banking sector of Georgia. This survey will capture what is the role of Business Intelligence in digital transformation and what are the changes in key performance indicators such as decision-making speed, cost efficiency, and data accessibility after BI adoption.

Finally, the concluding section of this thesis synthesizes the key findings derived from the analysis, articulates the main conclusions regarding the role of Business Intelligence in digital transformation within the Georgian banking sector, and offers recommendations for future research to address existing gaps and emerging trends in the field.

1. Theoretical Framework

1.1. Overview of the Selected Companies

Georgia's banking sector is highly concentrated, with two institutions – TBC Bank and Bank of Georgia. These two companies are dominating the market.

TBC Bank, founded in 1992 in Tbilisi, has grown from a small start-up with a minimal capital of $500 into an FTSE-250 listed financial group and one of the country's largest banks. It is recognized as a technology-driven bank and is often cited as a leading universal banking institution in Georgia (TheBanks.eu, n.d.). Its total assets reached about GEL 32 billion by 2023, reflecting significant growth and an expansive customer base. By many metrics, TBC is either the largest or second-largest bank in Georgia, tied with its main competitor, Bank of Georgia (TheBanks.eu, n.d.).

TBC Bank's strategic focus on digital transformation dates back over a decade. By 2012, TBC bank had presented new multi-channel digital distribution systems and earned industry awards for its early innovations (TBC Bank Group PLC, 2023). A milestone in TBC's digital journey came in 2018 when it launched "Space," Georgia's first fully digital neobank (Fintech Futures, 2018). Since then, TBC Bank has expanded its digital service portfolio. By 2021, TBC had achieved 95% "offloading" of transactions to digital channels in retail and SME segments, which means that majority of routine transactions were conducted by the internet or mobile banking rather than at physical branches (Global Finance Magazine, 2024). TBC Bank's digital transformation efforts have earned huge recognitions. For example, Euromoney named TBC as the "Best Digital Bank in Georgia" in 2024, because of the bank's significant expansion of digital services, growth in mobile app usage, and high adoption of digital loans and transactions (TBC Bank Group PLC, n.d.). The award noted TBC's "innovative approach" to tech-enabled services and dominance by digitalization in Georgian (TBC Bank Group PLC, n.d.). These honors reinforce TBC Bank's reputation as a leader position in digital banking innovation in the region.

Bank of Georgia, established in 1994, similarly evolved into a leading bank offering retail, corporate, and investment banking services (DCFmodeling.com, 2024). The bank experienced significant expansion and, like TBC, listed on the London Stock Exchange Market. Over the period, its international capital raised up to £250 million (DCFmodeling.com, 2024). By the end of 2023, Bank of Georgia's total assets were around GEL 31.4 billion, representing about 38.7% of the market (DCFmodeling.com, 2024). It has a broad customer base of over 2.6 million clients (DCFmodeling.com, 2024). In 2023 Industry analyses identified Bank of Georgia as the single largest bank by assets in the country. Together TBC Bank and Bank of Georgia control 77–78% of Georgia's banking assets (TheBanks.eu, n.d.). This duopolistic position highlights their importance: the digital transformation of Georgia's banking sector is largely driven by these two leading banks, making them compelling case studies for analysis.

Bank of Georgia has followed a parallel path of digital transformation in direct competition with TBC. The bank launched its first major mobile banking application in 2015, which marked the beginning of an aggressive push towards digital channels (Strands Finance, 2020). A notable aspect of Bank of Georgia's digital strategy has been its collaboration with fintech partners to enhance customer experience. For exapmle BOG partnered with a fintech provider to incorporate a personal finance management (PFM) tool into its mobile app, aiming to provide customers with personalized insights into their spending and budgeting (Strands Finance, 2020). The PFM features increased customer engagement, with daily digital platform usage increasing significantly. Such outcomes highlights how BOG has utilized data analytics and customer intelligence – essentially forms of business intelligence – to tailor its digital offerings to user needs.

By the mid-2020s, Bank of Georgia had established itself as a digitally driven institution. As of 2024, the bank reported over 1.5 million monthly active users of its retail digital channels (Lion Finance Group PLC, 2024). 2024, Global Finance Magazine named BOG as the "World's Best Digital Bank" – a prestigious award that acknowledged the bank's cutting-edge digital platforms (Lion Finance Group PLC, 2024). To support this leadership, Bank of Georgia has also invested in its data infrastructure s well: for example, it implemented an open data lakehouse architecture in partnership with Cloudera to consolidate enterprise data and enable advanced analytics for faster product development and decision-making (Lion Finance Group PLC, 2024). This move highlights the main role of business intelligence (big data and analytics platforms) in underpinning the bank's digital transformation efforts.

The decision to focus on TBC Bank and Bank of Georgia as case studies is driven by several reasons. First, these two banks are the clear market leaders in Georgia's banking sector, together accounting for about three-quarters of the industry's assets and loan portfolio. No other Georgian bank approaches their scale (the third-largest holds only 5% of assets) (TheBanks.eu, n.d.). According to the significant market share, these companies provide a representative view of the sector's transformation. Their leading positions mean that their strategies and innovations have an important impact on the market and they have a pattern to set industry benchmarks.

Second, according the facts, both TBC and BOG have been pioneers in digital transformation in the region. They were among the first to introduce online banking, mobile apps, and digital-first products in Georgia, and they continue to invest in cutting-edge technologies (from neobanking platforms to data analytics solutions). This makes them ideal exemplars for studying how digital transformation unfolds in practice, and how Business Intelligence (BI) can act as a catalyst in that process. In both banks, BI-driven insights inform strategic decisions, using advanced data analytics, which demonstrates the catalyst role of data in digital initiatives.

Third, TBC Bank and Bank of Georgia provide ample publicly available information and are recognized by international observers, which enhances the reliability and depth of a literature review. As publicly

listed companies, their annual reports and achievements are documented by reputable sources. This transparency allows for a well-informed analysis based on verified data.

Finally, studying two banks together allows for a comparative perspective. Considerably both of them have similar goals with subtle differences in their approaches (for example, TBC's creation of a stand-alone neobank vs. BOG's integration of fintech solutions), enriching the discussion on how various strategies in digital transformation can succeed in the Georgian context. In summary, the selection of TBC Bank and Bank of Georgia is justified by their dominant sectoral role, their proactive and innovative digital transformation journeys, and the relevance of their experiences to the thesis theme of business intelligence as a catalyst for digital change. By focusing on these leading banks, the literature review highlights Georgia's banking innovations, setting the stage for deeper analysis of how BI tools and practices are driving digital transformation in this emerging market's financial industry.

1.2. Digital Transformation

Digital transformation in banking is typically defined as the process of utilizing digital technologies to significantly enhance the performance, reach, and efficiency of banking services. (Westerman, Bonnet, & McAfee, 2014). It involves a strategic overhaul of business activities, organizational structures, and competencies to fully harness the opportunities of digital technologies (such as mobile applications, big data analytics, business intelligence, cloud computing, artificial intelligence, etc.) for competitive advantage. Westerman et al. (2014) identified three key pillars on which banks pursue digital transformation: customer experience, operational processes, and business models (Westerman, Bonnet, & McAfee, 2014). Each pillar includes multiple elements that change, for example, improving customer experience through better customer insight and digital customer touchpoints, automating and optimizing operations through process digitization and data-driven management, and inovating business models by offering new digital products or leveraging existing platforms (Westerman, Bonnet, & McAfee, 2014). The goal is to become a "digital enterprise" or "digital leader*"* in the industry, which means not only adopting new technologies but also fostering organizational change and digital culture. One helpful definition comes from MIT Sloan: digital transformation is "the use of technology to radically improve the performance or reach of enterprises", and it requires combining digital activities with strong leadership to turn technology into transformative change (Westerman, Bonnet, & McAfee, 2014). This highlights that digital transformation is as much about strategy and leadership as it is about technology development.

In the context of banking, digital transformation means moving away from traditional branch-centric, paper-based operations to a model where banking products and services are delivered through digital chanels in real-time, customized to customer needs, and often in an automated or self-service manner.Ddigital transformation requires banks to re-think how they interact with customers and how they operate internally (Diener & Špaček, 2021). Key aspects of digital transformation include a focus on

agility, data utilization, and integration of systems across front-end and back-end. Importantly, digital transformation is an ongoing journey rather than a one-time IT project – it encompasses continuous innovation and responsiveness to new technological trends (such as artificial intelligence, open APIs, etc.). In summary, digital transformation in banking can be defined as a comprehensive business evolution that leverages modern digital technologies to deliver superior customer value, streamline operations, and create new business opportunities in the financial sector.

1.2.1. Digital Transformation in Banking Systems (General)

Global banking has experienced significant digital transformation over the past decade. Banks around the world have invested heavily in digital channels and technology-driven solutions to meet changing customer expectations, respond to competitive pressures from fintechs, and address the efficiency imperatives of modern finance. (Diener & Špaček, 2021). Some general trends and components of digital transformation in banking systems include:

Proliferation of Mobile and Online Banking: The widespred use of smartphones has driven banks to develop full-featured mobile banking apps, providing customers 24/7 access to their accounts and services (Diener & Špaček, 2021). Traditional banks have extended their online offerings to cover services that required branch visits before – from account opening and loan applications to customer support by chatbots (Diener & Špaček, 2021). The shift to mobile and online banking systems has greatly enhanced convenience and become a baseline expectation for consumers.

Digital Payments and Cashless Transactions: There has been a significant shift toward digital payment methods, including contactless payments, mobile wallets, and peer-to-peer payment platforms. (Diener & Špaček, 2021). Banks have partnered with technologies like Apple Pay, Google Pay, QR code payments, etc., to facilitate faster and more secure transactions. This trend is associated with increasing e-commerce and a societal move toward cashless economies.

Data Analytics and Personalization: Modern digital banking platforms generate vast amounts of data on customer behavior. Through advanced data analytics and algorithms—often powered by artificial intelligence (AI) and machine learning (ML)—banks can gain valuable insights into customer needs, behaviors, and preferences (Diener & Špaček, 2021). This facilitates the delivery of highly personalized services and product offerings. For instance, AI-generated analysis allows banks to trailor financial advice or recommend specific products to individual customers, also improving customer experience and loialty (Diener & Špaček, 2021).

Moreover, Business Intelligence (BI) plays a foundational role in enabling such personalization. BI systems integrate data from different sources, giving banks the possibility to build comprehensive customer profiles and perform granular segmentation (Adewumi et al., 2024). These insights support strategic marketing, customer relationship management, and cross-selling efforts. As noted by Hoylara

and Baer (2023), BI applications in banking extend beyond retrospective analysis, providing predictive insights that anticipate customer needs before they emerge. Additionally, BI ensures that personalization strategies are based on reliable, enterprise-wide data, thereby improving decision-making quality and reducing risks associated with biased or incomplete data interpretation (Rahman, 2023). As BI capabilities advance, they increasingly form the analytical backbone for customer-centric digital transformation in banking systems.

While many of these authors emphasize customer engagement as a primary benefit of BI, it is equally important to highlight the role of BI in increasing operational efficiency and automating internal business processes—a dimension somewhat underexplored in their discussions. For instance, Rahman (2023) provides empirical evidence that implementing BI greatly boosts efficiency, thereby increasing profitability. The elements of BI—such as automation and process optimizations — play vital role in the banking sector's digital transformation and will be explored further in the data analysis section of this thesis.

Enhanced Security and Cybersecurity Measures: As banking goes digital, cybersecurity becomes paramount. Banks invest in advance security technologies (biometric authentication, encryption, AI-based fraud monitoring) to protect customer data and transactions (Abuselidze & Zoidze, 2023). Regulatory compliance (e.g., data protection laws) also drives the need for robust security frameworks as part of digital transformation.

Collectively, these efforts are transforming the banking landscape. Banks that successfully integrate digital technologies tend to achieve improvements in operational efficiency and customer satisfaction. For example, digitization is associated with lower operational costs; A study found that Internet banking and associated digital services markedly decreased banks' operating expenses, enhancing profitability. (Abuselidze & Zoidze, 2024). Digitalization also expands a bank's market reach: by breaking geographical barriers, banks can serve customers in remote areas or new markets without physical branches (Abuselidze & Zoidze, 2024). Indeed, digital banking is seen as a key driver of financial inclusion in many emerging markets, providing convenient access to financial services for wider segments of the population (Abuselidze & Zoidze, 2024).

At the same time, traditional banks face competitive pressure from digitally-native fintech firms and online-only banks, known as "neobanks." To stay competitive, banks have had to acceleraten their digital transformation efforts. Researchers point out that banks cannot ignore the advantages possessed by fully digital banks; established institutions need to enhance their digitization of operations to uphold their market standing (Abuselidze & Zoidze, 2024). Essentially, digital transformation is not merely about efficiency; it is a strategic requirement for banks to protect and expand their market share.

However, it is important to acknowledge that digital transformation in banking also encounters obstacles. Many banks struggle with legacy IT systems, complex regulatory requirements, and the need to retrain or realign their employees. A qualitative study by Diener and Špaček (2021) found that while banks

recognize the importance of digital change, they meet numerous barrierrs including issues in strategy and management, technological and regulatory hurdles, and challenges related to customer and employee adoption (Diener & Špaček, 2021). These barriers will be discussed in more detail in Best Practices and Challenges sub topic. Overall, the general trajectory is clear: banking systems worldwide are undergoing a digital revolution that is fundamentally transforming how banking products are delivered and how banks function internally.

1.2.2. Industry-Specific Examples In Georgia

Bank of Georgia (BOG): The Bank of Georgia is one of the two largest banks in Georgia and has been a leader in digital transformation. Along TBC Bank, it represents approximately 77% of the total banking asset in Georgia (Abuselidze & Zoidze, 2023), positioning these banks as trendsetters in the industry. The Bank of Georgia has well-documented strategy of leveraging technology to enhance services and boost efficiency. The bank was among the first to launch internet and mobile banking platforms in the country. Its first major iteration of a mobile banking app debuted in 2017, bringing added functionality rather than previous online offerings (Abuselidze & Zoidze, 2023). This early start in digital banking proved benefits: the convenience of mobile access resulted in quick user adoption, and in the following years, the bank's digital user base experienced significant growth. By 2021, BOG introduced a specialized mobile application for corporate and SME clients, enhancing its 2019 launch of a new online banking platform for businesses (Abuselidze & Zoidze, 2023). The purpose of these platforms was to provide financial management system for clients. For instance, business internet banking platform included a Personal Financial Management (PFM) tool to help business customers analyze transactions and make financial decisions (Abuselidze & Zoidze, 2023).

Over time, Bank of Georgia has expanded its range of digital products. During 2020, the COVID-19 pandemic forced banks to ahcieve digitization of many processes. Bank of Georgia responded by transitioning numerous services to remote channels and improved its mobile and internet banking funcions to minimize the need of branch visits (Abuselidze & Zoidze, 2023). Over the past few years, Bank of Georgia has implemented a range of digital payment solutions: it was among the first in Georgia to provide contactless payments and integrate with global mobile wallets like Apple Pay and Google Pay (Abuselidze & Zoidze, 2023). The bank also introduced QR code payments and "Buy Now, Pay Later" (BNPL) service – innovations designed to offer advanced, user-friendly payment solutions for customers (Abuselidze & Zoidze, 2023). Moreover, Bank of Georgia has been leveraging artificial intelligence, business intelligence, and data analytics to improve its online banking. According to Abuselidze and Zoidze (2023), BOG's internet banking users can receive personalized business offers based on analysis of their data. This indicates an integration of BI capabilities (data-driven personalization) into the bank's digital channels.

Bank of Georgia's digital transformation is reflected in its performance. The bank indicates that a significant and increasing portion of transactions and product sales occurs via digital channels. For example, non-cash, remote transactions have increased markedly in the past few years, reducing the dependance on physical branches (Abuselidze & Zoidze, 2023). By the end of 2024, the Bank of Georgia reported around 1.8 million monthly active digital users (retail customers) across its online and mobile platforms (Bank of Georgia, 2024), highlighting the extensive reach of digital banking among its client base.

BOG's leadership position in digital banking has earned it international accolades: in 2024, Global Finance magazine named Bank of Georgia the "World's Best Digital Bank" in its category (Bank of Georgia, 2024). This worldwide recognition reflects the bank's commitment to innovation and digitalization. Bank of Georgia claims to be a digital leader in its sector, emphasizing that its digital offerings can compete with leading global fintech firms (Bank of Georgia, 2024). Overall, the case of Bank of Georgia demonstrates how a Georgian bank has leveraged digital transformation—from mobile applications to AI-driven services—to enhance its market position, elevate customer experience, and attain international recognition.

TBC Bank: TBC Bank is another major player in Georgia's banking sector and a close competitor to the Bank of Georgia. It has similarly developed digital transformation, often innovating in parallel with or even ahead of Bank of Georgia in several fields. TBC's strategy is centered around themes such as "Digital Horizons." Its Annual Report 2024 was aptly named "Digital Horizons: Generating Tangible Results," emphasizing the bank's commitment to digital innovation as a key factor in achieving business results. TBC's digital transformation covers both domestic operations and international expansion. Domestically, TBC has provided out several digital services: for example, it introduced virtual digital cards as an alternative to physical plastic cards, giving customers possibility to transact online (Abuselidze & Zoidze, 2023). TBC also developed totally online proceses – such as an online mortgage loan platform system and end-to-end digital installment loan systems – to provide fast, remote credit services to customers. The bank has been active in integrating BNPL (Buy Now, Pay Later) options and other fintech-style offerings into its retail banking model, keeping pace with global trends (Abuselidze & Zoidze, 2023).

TBC Bank's focus on omnichannel experience means it has worked to ensure customers can access services through multiple digital touchpoints. It reports a high "retail offloading ratio," which means the majority of retail transactions are now conducted by the remote channels (mobile, internet, ATMs) rather than at teller counters trends (Abuselidze & Zoidze, 2023). This represents that TBC's customers have adopted digital banking for day-to-day usage, a direct outcome of the bank's sustained investments in user-friendly digital platforms. The bank has also pursued geographical expansion and is using digital channels in Uzbekistan. In recent years, TBC entered the Uzbek market primarily through a digital banking subsidiary and has achieved marked scaling there, highlighting how digital capabilities enable expansion without the traditional branch network footprint (TBC Bank, 2024). TBC's management has

emphasized increased digital engagement as a key success in 2024, alongside record profits and growth (TBC Bank, 2024). This suggests that TBC's digital transformation is translating into strong financial results and user growth.

Internally, TBC Bank utilizes data analytics and business intelligence to support its strategy goals. While specific BI projects at TBC are not extensively detailed in public sources, it is known that the bank launched a separate fintech arm called "TBC Capital" and a digital platform "TNET" – these likely involve significant analytical capabilities to drive personalized services and to support the bank's digital ecosystem (which includes e-commerce, payments, and even non-banking services). TBC has participated in partnerships with global tech firms as well. For example, it was among the first banks in the region to implement open banking APIs and to experiment with emerging technologies like blockchain in pilot projects. Given TBC's scale and innovation drive, its digital transformation journey, much like Bank of Georgia's, underscores the critical role of leadership and vision in the market. The Chairman's statement in the 2024 Annual Report underscores the bank's commitment to "making people's lives easier" through digital means and highlights the confidence with which TBC approaches the future by its strong execution of digital strategy in Georgia and Uzbekistan (TBC Bank, 2024). To conclude, TBC Bank's example shows a Georgian bank leveraging digital transformation not only to modernize domestic operations but also to propel regional expansion and maintain robust financial performance.

1.3. Business Intelligence

Business Intelligence (BI) refers to the technologies, processes, and practices that enable organizations to gather, integrate, analyze, and present business information, to improve decision-making. Essentially, BI focuses on converting data into actionable insights. (Corinium Intelligence, 2021). A classic definition by Howard Dresner (Gartner, 1989) framed BI as an umbrella term for concepts and methods to enhance decision-making using "fact-based support systems." Today's definitions have expanded on this. For example, Forrester Research defines BI as "a set of methodologies, processes, architectures and technologies that transform raw data into meaningful and useful information, used to enable more effective strategic, tactical and operational insights and decision-making" (Williams, 2016). This definition emphasizes that BI includes not only analytical tools but also the data management infrastructure and processes necessary to maintain data quality and relevance. It also highlights that BI aids decision-making at all levels of an organization (strategic planning, tactical management, and operational execution).

A BI system generally encompasses components for data storage, such as data warehouses or data marts that compile data from multiple sources. Data integration, involving ETL (extract, transform, load) processes to prepare data, data analysis and visualization, utilizing reporting tools, dashboards, OLAP tools, and data mining algorithms, etc.). The outputs of BI are often reports, dashboards, and analytic

queries that talk about business performances. BI analysts use these to identify trends, track key performance indicators (KPIs), and show potential oportunities or problems. For example, BI dashboard can show bank's real-time metrics on loan portfolio growth, customer acquisition, or fraud cases, which empowers managers to make decisions quickly (Williams, 2016).

In recent years, a convergence between BI and big data analytics is observable. The rise of big data technologies (Hadoop, Spark, alongside AI and machine learning, has expanded the definition of BI. Nowadays, many BI platforms integrate predictive analytics, also referred to as business analytics. It's important to note the difference between business intelligence and business analytics: BI typically focuses on descriptive analysis, exploring "what is happening or has happened" through metrics and dashboards, while business analytics is about predictions or prescriptions, using statistical models or machine learning to forecast future trends and forecast recommendations (Corinium Intelligence, 2021). However, in practice, the line is blury, and modern BI platforms increasingly include advanced analytics as well. The focus remains on enabling data-driven decision-making. As stated, "BI is increasingly recognized as a strategic necessity for modern enterprises, offering critical insights and fresh perspectives that, when utilized quickly and effectively, can greatly improve business performance" (Qatawneh, 2024).

BI Tools and Technologies: The BI landscape encludes a variety of tools from simple to sophisticated ones. Common categories are: reporting and querying software (used for formatted reports and SQL queries), online analytical processing (OLAP) tools (designed for multi-dimensional analysis of data), data visualization and dashboard tools (which provide interactive graphs, charts, and maps), and data mining and machine learning tools (for discovering patterns and developing predictive models). Within the finance sector, notable BI solutions comprise enterprise options like Oracle BI and IBM Cognos, as well as self-service platforms like Tableau, QlikView, and Microsoft Power BI (Khan, 2024).

Core Components of BI Tools: Data Integration and Warehousing - BI tools often begin with data integration processes, gathering information from multiple sources into central warehouses. This consolidation ensures consistency and accuracy in the data used for analysis (Chauhan et al., 2023).

Online Analytical Processing (OLAP): OLAP systems allow users to perform multidimensional analyses of data, allow users complex calculations, trend analyses, and data modeling. These capabilities support in-depth business insights and forecasting (Chauhan et al., 2023).

Data Mining and Predictive Analytics: BI tools use data mining methods to identify patterns and connections in extensive datasets. Predictive analytics allows organizations to forecast future trends and behaviors, aiding proactive decision-making (Chauhan et al., 2023).

Data Visualization: Effective BI tools offer robust data visualization features, including dashboards, interactive reports, and live monitoring reports, to present complex data in an accessible and user-

friendly format. This visualization aids stakeholders in quickly check key insights and making informed decisions (Chauhan et al., 2023).

Cloud-Based vs. On-Premise Business Intelligence Tools: The deployment models of Business Intelligence (BI) tools—cloud-based and on-premise—present distinct advantages and challenges that merit examination.

Cloud-based BI tools operate on remote servers and are accessed online, providing scalability, flexibility, and cost efficiency. These solutions allow organizations to quickly implement BI capabilities without significant upfront infrastructure investments.

Dziembek and Ziora (2022) conducted a study on medium and large Polish companies, finding that cloud BI systems greatly improve decision-making by offering real-time data access and analysis. The study highlighted benefits such as improved efficiency, faster decision-making, and assistance with crucial business operations. Nonetheless, it also raised concerns about data security and challenges with integration.

A-Aqrabi et al. (2019) highlighted the ability of cloud computing to overcome the resource constraints of conventional BI systems. Their study showed that cloud-based BI platforms could effectively manage Online Analytical Processing (OLAP) demands through extensible parallel processing, thereby supporting large-scale data analysis.

On-premise BI tools are installed and operated on an organization's internal servers, providing greater control over data and more customization options. These solutions are often preferred by organizations with strict data security needs.

Cloud-based and On-premise Analysis: Choosing between cloud-based and on-premise BI tools involves trade-offs related to scalability, cost, control, and security. Cloud-based options offer rapid deployment and scalability, making them suitable for organizations that need flexibility and reduced initial expenses. Nonetheless, worries about data security and integration with existing systems may pose challenges. On the other hand, on-premise solutions offer enhanced control and customization, but require substantial infrastructure investments and may not match the agility of cloud-based alternatives (Vassilenko, 2022).

Organizations must carefully assess their specific needs, regulatory environment, and resource availability when selecting between these deployment models. In certain situations, a hybrid approach that integrates aspects of both cloud-based and on-premise solutions might provide a balanced strategy, utilizing the advantages of each model while minimizing their drawbacks.

An important factor in choosing on-premise BI is the need for internal IT skills. Organizations selecting on-premise deployment must employ dedicated positions like system administrators, database engineers, data warehouse specialists, and security staff to ensure smooth operation, update management, and adherence to compliance standards. (Al-Aqrabi, Liu, Hill, & Antonopoulos, 2019).

This increases the complexity of implementation and long-term maintenance. According to Vassilenko (2022), using on-premise BI infrastructure often requires larger IT workforce to manage the physical infrastructure, ensure data integrity, and respond to technical issues in real-time (positions like data-ops, dev-ops, system admins). These requirements can increase total cost of ownership (TCO) and slow down the organization's ability to innovate quickly compared to cloud-based alternatives.

Global Trends in BI Adoption (Finance Sector): Across industries, many organizations praise business intelligence (BI) solutions for improved performance and even survival key factor in rapidly changing markets (Adetumi, 2024). In the finance sector specifically, BI has become integral. A comparative review by Adetumi (2024) examined BI tool adoption in the USA versus Africa's financial industries and found that in advanced markets like the U.S., banks widely use BI for optimizing fraud detection, enhancing customer service, and improving credit scoring models. These applications utilize business intelligence (BI) to mitigate risks and personalize customer interactions. In African markets (and similarly in other emerging regions), a key BI application is using data insights to drive financial inclusion to analyze customer data to design products and to bridge the gap between traditional banking and digital services (Adetumi, 2024). While the specific focus of BI projects can vary by region and maturity of the banking sector, the underlying theme is the same: using data to make smarter decisions, improve efficiency, and gain competitive advantage.

Another trend is the increasing integration of AI and machine learning into BI workflows (often termed augmented analytics). Modern BI software may automatically underline anomalies or create insights and at the same time reduce manual analysis neccesity (Rahman, 2023). For banks, this means faster response to issues and the ability to simulate decisions (using predictive models, for instance). Furthermore, the concept of real-time BI allow banks to monitor events in real time, which is essential for immediate fraud interdiction or dynamic pricing of services.

In conclusion, business intelligence today is a vast and continually developing area. Its core purpose is to provide evidence-based insights for decision-making. The shift from IT-centric BI to more democratized, self-service BI mirrors the cultural shift in organizations toward data-driven decision culture s(Rahman, 2023). As data storages and variety grow BI systems have adapted by incorporating more advanced analytics and user-friendly interfaces. This sets the stage for examining how BI is specifically applied in banking systems and how it supports digital transformation objectives, which we turn to next.

1.3.1. BI In Banking Systems (General)

As banks traditionally have been data-rich organizations, BI is often viewed as a strategic tool that can turn the massive amounts of data generated by financial transactions and customer interactions into actionable business strategy. BI in banking systems can be defined as the use of data analytics and

information systems to support banking decision-making, ranging from day-to-day operational decisions (like flagging a risky transaction) to high-level strategic decisions (like which new product to launch or which branch to close). In the last two decades numerous banks worldwide have aggressively pursued BI to anayze data for competitive advantages (Rahman, 2023).

One driving factor for BI adoption in banking system is the need to improve operational efficiency and profitability and minimize costs. Empirical research has demonstrated clear advantages of BI on these fronts. Rahman (2023) conducted a study in a banking context (27 branches of a Bangladeshi commercial bank) and found that implementing BI had a significant positive effect on both operational efficiency and profitability of the bank's branches. Also, the study showed that BI-driven improvements in efficiency (e.g., faster processing, better resource allocation through analytics) in turn led to higher profitability. This implies lots of benefits: BI helps banks streamline operations (reducing costs, reducing service times), which enhances financial performance. The rationale, grounded in competitive strategy theory, is that BI allows a bank to generate superior margins by being smarter and faster than competitors – offering better services at lower cost – thus ensuring a competitive advantage (Rahman, 2023). Similarly, from a resource-based view, BI can be seen as a strategic resource that helps build unique organizational capabilities (like superior customer insight or risk management proficiency) that competitors find hard to replicate (Rahman, 2023). These findings explain why many bank management consider BI investments are crucial to remain competitive and efficient in a data-driven financial marketplace.

Key Drivers of BI Adoption in Banking: Several studies have examined what factors influence banks to adopt BI technologies. A recent study by Qatawneh (2024) provides insights using the Technology-Organization-Environment (TOE) framework in case of Jordanian banks. The research found that technological, organizational, and environmental factors significantly affect BI adoption. Specifically, factors like relative advantage of BI, top management support, competitive pressure, and regulatory support were positively associated with the BI adoption cases (Qatawneh, 2024). Interestingly, Qatawneh's study noted that "organizational readiness" (which means necessary skills, and infrastructure) was not a significant factor in their model for BI adoption. This could suggest that even banks that are not fully internally prepared are still adopting BI due to external pressures or the market. The findings overall emphasize the need for a comprehensive approach: banks should address technological capability (e.g., data warehouses, software), organizational factors (leadership vision, training employees on data literacy), and environmental alignment (complying with data regulations, responding to competition) to successfully adopt BI (Qatawneh, 2024).

Another driver is the goal of improving decision-making quality and speed. Banks deal with decisions that range from granting a loan, detecting fraud, to strategic planning. BI tools improve the speed of decision-making by providing time-sensitive analytics. For example, dashboards that update daily on credit portfolio indicators, or even real-time alerts on fraudulent transactions (Qatawneh, 2024). A bank

that uses BI can, for instance, analyze customer segmentation to decide which customers to target for a new product, rather than relying purely on general market trends. Qatawneh's 2024 study looked at decision-making performance during digital transformation and found that greater BI adoption was linked to better decision outcomes in banks. In other words, banks that actively use BI reported more comprehensive and faster decision processes, contributing to overall firm performance. This aligns with the main question of this study, which is that BI acts as a core modern decision support system in banking, leveraging sophisticated IT and methodologies to produce insights for opportunities and challenges (Qatawneh, 2024).

BI Maturity Models in Banking: To evaluate how well a bank is leveraging BI, researchers and consultants often discuss "BI maturity." Although the review sources do not explicitly outline a particular maturity model, we can deduce from the context and general business intelligence literature. Typically, BI maturity models in banking describe levels such as: Initial/basic (data in silos, ad-hoc analysis, few dedicated BI resources), Managed (central data warehouse, regular reporting, some KPIs tracked), Defined (established BI team and tools, dashboards for many functions, data governance in place), Integrated (BI is integrated with operations, predictive analytics used, most decisions data-informed), and Optimizing (continuous improvement, advanced analytics and AI pervasive, data-driven culture enterprise-wide).

From the Georgian banking perspective, Bank of Georgia and TBC Bank would likely be at higher maturity levels – they both have centralized data warehouses feeding enterprise dashboards and have started implementing AI, indicating a move from descriptive to predictive analytics. Their annual reports highlight digital and data excellence, which implies a data-driven culture at the top. For instance, BOG's mention that its digital channels compete with fintechs and its use of AI for personalized offers (Bank of Georgia,2024) suggests a high BI maturity (embedding analytics into customer interactions). TBC's focus on digital engagement and strong execution hints that it uses data heavily to drive customer usage and to scale in new markets (TBC, 2014). In general, as Georgian banks digitally transform, their BI maturity is also improving. Abuselidze and Zoidze (2024) implicitly reflect this by analyzing metrics like the share of digital product sales, which relies on good internal data collection and analysis.

It's also worth noting regulatory drivers for BI in banking. Regulators often require detailed data reporting (Basel accords, risk reports, anti-money laundering reports). Complying with these efficiently pushes banks to develop robust BI systems to compile and analyze required data. Additionally, competition in the Georgian market (where BOG and TBC are very close rivals) likely spurs each to outdo the other in analytics capabilities – whether in marketing (customer analytics to drive campaigns) or risk management (using analytics to better price loans and manage defaults).

In summary, BI in banking is seen as a cornerstone of modern banking management. The drivers for adopting BI include the pursuit of efficiency, profitability, improved decision quality, and staying competitive in a fast-evolving digital environment. Banks that lead in BI usage are often those that lead

in performance. The maturity of BI usage can vary, but there is a general trend of progression from simple reporting towards complex, integrated analytics (AI/ML). The literature and industry evidence suggest that while technology (tools) is important, factors like leadership support, clear strategy, and employee skills are equally vital in successfully deploying BI in banks. As banks progress in digital transformation, they often simultaneously advance in BI maturity, since digital channels provide more data and digital strategies demand more analytics to guide them.

1.3.2. Industry-Spesific Examples in Georgia

Bank of Georgia's strong digital orientation goes hand-in-hand with its use of business intelligence. Being a large bank with millions of customers and transactions, BOG has invested in data systems that allow it to analyze customer behavior, product performance, and operational metrics on an ongoing basis. One concrete example of BI in action is BOG's AI-driven personalized offers to internet banking users (Abuselidze & Zoidze, 2024). the bank examines customer transaction and interaction data, employing machine learning algorithms to determine which products or services a customer may need. For instance, if data shows a particular customer frequently transfers money abroad, the bank might proactively offer them a specialized remittance service or a multi-currency account via a prompt on their internet banking dashboard (Abuselidze & Zoidze, 2024). This kind of targeted marketing is a BI application that improves cross-selling and customer satisfaction. It reflects a shift from mass marketing to data-driven individualized marketing in banking.

Bank of Georgia also uses BI extensively in risk management. Although not detailed in the text, virtually all banks of BOG's scale use credit scoring models (a form of predictive analytics) to make lending decisions. BOG's risk management reports (Abuselidze & Zoidze, 2024) show that it continuously monitors credit portfolio quality and uses internal rating systems. Those internal ratings and early warning systems are BI tools that aggregate customer financial data, behavior data (like account turnover), and macroeconomic indicators to predict default risk. Additionally, BOG's being awarded "Best Digital Bank" suggests it has outstanding data analytics on user experience – likely tracking digital channel usage metrics and using that data to refine its digital services. Indeed, BOG's annual report includes metrics like Digital MAU (Monthly Active Users) and the growth trend of this metric over the years (Bank of Georgia, 2024), which is a BI output used at the strategic level to gauge customer engagement success.

Operational BI is another focus area for BOG, which uses dashboards to track branch performance and process efficiency. For example, BOG's management reviews KPI dashboards daily or weekly (Bank of Georgia, 2024). These dashboards allow quick identification of issues, enabling management to take timely action. As dicussed in the paper "The effect of business intelligence on bank operational efficiency and perceptions of profitability" BI contributes to operational efficiency (Rahman ,2024). BOG's remarkable cost-to-income ratio improvements in recent years (Bank of Georgia, 2024) are attributed to BI-informed optimization, which will be analyzed in more detail in the data analytics part.

TBC Bank, much like Bank of Georgia, utilizes business intelligence widely, focusing on growth analytics and operations across multiple countries. One area TBC excels in is customer analytics for digital engagement. TBC's 2024 annual report highlights "increased digital engagement" as a point of success. This suggests that TBC systematically tracks how customers use its digital platforms and uses those insights to refine features or introduce incentives. For example, TBC bank analyzes data about how customers are ingaged in app using process (TBC, 2024). This practice of data-driven UX (user experience) enhancement is a BI-driven approach to product management.

TBC's expansion into Uzbekistan by a digital bank channel introduceses a rich field for BI. When entering in the new market, TBC bank relied on data to form the strategy, analyzing Uzbek customer behaviors, transaction patterns, and credit performance data to tailor its offerings. Because TBC in Uzbekistan started largely as a mobile-only service, virtually all customer interactions are capturable as a data. The "rapid, profitable scaling in Uzbekistan" that TBC achieved in 2024 (TBC, 2024) is indicator of strong BI capabilities that allowed it to make decisions quickly in that new market.

TBC has been innovative in digital products such as its fully digital bank account opening and lending processes. Behind these processes are BI systems for verification and risk scoring. For instance, when a customer opens an account online, TBC's BI intellingence systems cross-verify the applicant's data with various databases (credit bureau, government ID registry) in seconds and automatically approve or flag for review. That's an example of embedded BI in operations. TBC also introduced features like a virtual card and integrated loyalty platforms (TBC, 2024). Business intelligence systems were used to analyze the uptake and usage of these features to measure their success and profitability.

In summary, TBC Bank primary uses BI to drive its digital user growth, to efficiently manage and expand its operations (both domestically and abroad), and to maintain robust risk management. Its focus on innovation implies that it experiments with data-driven ideas. The success of these endeavors, as evidenced by performance indicators, underscores that TBC's BI capability is a key asset.

1.4. Best Practices in the Use of BI in Banking Systems

The integration of BI into banking operations has yielded many best practices, but banks also face some challenges and gaps in fully exploiting Business Intelligence potential. This represents insights on what banks should do and avoid when using BI.

Strong Leadership and Strategic Alignment: A recurring theme is that successful digital transformation and BI initiatives require top management vision and support (Westerman, Bonnet, & McAfee, 2014). Leadership should articulate clear goals for BI (e.g., becoming a data-driven bank) and align BI projects with the bank's strategic objectives. Westerman et al. (2014) found that the most successful companies combined digital technology deployment with strong leadership to achieve transformation. In practice, this means that bank executives promote data-driven decision-making and ensure that initiatives like

implementing a new data warehouse or analytics tool are not just IT projects but part of broader strategic programs.

Invest in Data Quality and Governance: A saying in BI is “garbage in, garbage out.” Banks must ensure the data feeding BI systems is accurate, consistent, and timely. This involves cleaning data, reconciling different data sources, and setting up governance policies (data ownership, data privacy compliance, etc.). The Corinium Global Intelligence report (2021) noted that BI professionals spend marked amount of time on data preparation and cleaning. In practize many banks created Data Governance Committee or assign Chief Data Officer to oversee data quality initiatives. As seen in Georgia, banks like BOG and TBC have in recent years highlighted data excellence; BOG’s awards for digital banking implicitly reflect strong back-end data management enabling those digital services (Bank of Georgia, 2024).

User Training and Culture Building: It’s widely acknowledged that having sophisticated BI tools is not successful if the staff cannot use them properly. A best practice is to provide comprehensive training to employees on how to interpret and act on BI reports. This goes from frontline staff using simple dashboard interfaces to middle management learning to do self-service analytics, up to executives understanding analytics outputs in strategy meetings (Westerman, Bonnet, & McAfee, 2014). Encouraging a data-driven culture is crucial – employees should be encouraged to ask for data when making decisions and to share insights. Some banks have implemented incentive programs or recognition for teams that successfully use data to drive improvements. When a culture of evidence-based decision-making takes hold, the organization becomes more receptive to BI initiatives. Diener and Špaček (2021) noted that employee participation is a key factor, and lack thereof is a barrier. So involving employees in the BI journey is also a best practice.

1.5. Gaps and Research Needs

Looking at the literature and industry reports, there are some gaps noted in the context of BI in banking: Limited Research on Managerial/Organizational Issues: While technical aspects of BI are well discussed, there is a gap in understanding the managerial barriers and how to overcome them. Diener and Špaček (2021) explicitly pointed out that few resources existed on barriers to digitalization in banking from a managerial perspective. This gap extends to BI usage – more research could focus on how banks can effectively change culture and structure to be data-driven. For example, what leadership styles or incentives best promote BI adoption among staff? This appears to be an area where academic literature is not yet robust, particularly in the context of emerging markets.

Geographical and Contextual Gaps: A lot of BI in banking research comes from developed countries or large emerging ones. There is a gap when it comes to smaller economies or transition economies (like Georgia). Abuselidze and Zoidze (2024) provided a valuable overview of Georgian banking digital trends, but specific studies on BI in Georgian banks are rare. Rahman (2023) filled a gap by studying

Bangladesh, and Qatawneh (2024) did so for Jordan. These indicate that context matters – factors significant in one country may differ from another. For instance, Qatawneh (2024) found organizational readiness not significant in Jordan, which could be a contextual finding. More localized research (perhaps case studies of Georgian banks implementing BI) would provide delicate insights. Georgian banks have unique conditions (like rapid growth post-Soviet, a highly concentrated banking sector, and a tech-savvy urban population alongside rural segments) that merit focused research on how BI plays out in that environment.

BI and Digital Transformation Outcomes: Another gap is in long-term assessment of how BI drives transformation. We have evidence that BI improves efficiency and decision-making (Rahman, 2023), but less is documented on how exactly BI contributes to what Westerman (2014) calls the “digital maturity” of a bank. For example, does high BI maturity correlate strongly with being a “digital master” in banking? Intuitively yes, but more empirical work could solidify this connection. Additionally, as digital transformation includes things like customer experience enhancement, research could examine BI’s role in customer satisfaction and loyalty in banking (e.g., do banks that use BI to personalize services see measurable lifts in customer retention?).

Technological Gaps – Real-time BI and Big Data: Many banks are still catching up on leveraging big data (e.g., unstructured data from social media or metadata from mobile usage) and real-time analytics. Research could address challenges and solutions for integrating unstructured data into BI (like analyzing call center transcripts or social media feedback using text mining to improve services). Likewise, implementing streaming analytics for fraud detection is crucial but challenging – studies on best practices for real-time BI in banking are needed. This would help banks understand how to handle the velocity aspect of big data.

Maturity Models and Benchmarking: There is room for developing or refining BI maturity models specific to banking and providing benchmarks. Banks would benefit from knowing, for instance, how they stack up against peers in BI capability. This kind of research could use surveys or case analyses to define stages of BI adoption in banks and what each stage looks like in terms of capabilities and outcomes. It can also highlight what it takes to move from one stage to the next (e.g., going from basic reporting to predictive analytics might require some changes).

In conclusion, while banks have made successful stages in using BI and there are established best practices, they must navigate an array of challenges from technical integration to human factors. The literature indicates that achieving the full promise of BI – making a bank truly “data-driven” – is not easy and not yet universal. Many banks are still in intermediate stages of this journey, dealing with barriers of skills, culture, and legacy constraints. Addressing these problems requires both managerial action (change management, training, strategy alignment) and often further research to provide insights and solutions (particularly contextual research in less-studied banking markets). As banks persist with digital

transformation, the hope is that these BI-related challenges will be progressively overcome, closing the gaps between potential and reality.

Empirical research on BI in banking has been burgeoning in recent years, reflecting the growing importance of data-driven approaches in financial services. This section highlights key findings from recent empirical studies and identifies areas where further research is needed, especially in the context of BI as a catalyst for digital transformation.

Notable Empirical Findings: A number of studies have quantitatively examined the impact of BI on bank performance and decision-making:

Rahman (2023) – BI's Impact on Efficiency and Profitability: As discussed, Rahman's study in FinTech (MDPI) used data from bank branches in Bangladesh and robust statistical methods (PLS-SEM) to test hypotheses about BI's effects. It empirically confirmed that BI implementation is associated with higher operational efficiency and that this efficiency mediates improved profitability for the bank. This study is significant because it provides hard evidence supporting the often-quoted claim that BI provides competitive advantage. It also filled a geographic gap in literature by exploring a developing country context, noting that prior to it, the link between BI and bank performance had not been extensively studied in that context (Rahman, 2023). The implication for bank managers is that investments in BI can yield tangible financial returns, and for researchers, it confirms BI as a worthwhile area of study under frameworks like resource-based theory (Rahman, 2023).

Qatawneh (2024) – BI Adoption and Decision-Making Performance: Qatawneh's work (in Journal of Open Innovation, 2024) took an empirical look at Jordanian banks, examining both the drivers of BI adoption and its effect on decision-making quality (Qatawneh, 2024). Using surveys and structural modeling, the study found that technological and environmental factors are strong drivers for adopting BI, and importantly, that banks with higher BI adoption levels reported better decision-making performance during their digital transformation efforts (Qatawneh, 2024). This suggests that BI contributes not only to outcomes like profit (as Rahman found) but also to the process of how decisions are made – presumably making them faster, more data-grounded, and more effective. The study extended the TOE (Technology-Organization-Environment) framework and provided empirical evidence that complements more qualitative insights about barriers and enablers. One interesting outcome was the non-significance of organizational readiness, hinting that even banks that are not fully prepared internally are pushed or able to implement BI due to external pressures or clear benefits (Qatawneh, 2024). This raises further questions as to what happens post-adoption if readiness is low – an area for future research (how to sustain and fully utilize BI after initial adoption).

Adetumi et al. (2024) – Trends in BI Tools (USA vs Africa): Though more of a comparative review than a hypothesis-driven study, this work collected data on BI tool usage in different regions (Adetumi, 2024). It highlighted empirically (through case examples and possibly some survey data) differences in BI applications: e.g., U.S. banks focusing BI on fraud, service, credit scoring, while African institutions use

BI to address inclusion and digital divide issues (Adetumi, 2024). The empirical value here lies in contextualizing BI – showing that the impact of BI can vary by socio-economic context. It underscores a gap: many regions (like Caucasus, Central Asia) are not deeply examined in BI literature, a gap that future comparative studies could fill, perhaps following Adetumi's model of cross-regional comparison.

Diener and Špaček (2021) – Managerial Perspective on Digital Transformation: While not solely about BI, this qualitative study based on interviews with German bank executives gave insight into perceived obstacles and by extension, where empirical gaps might be (Diener & Špaček, 2021). It found that strategy, management, technology, regulation, customers, and employees are all major areas of concern in digital transformation, with various sub-barriers under each (Diener & Špaček, 2021). This indirectly points to why some BI initiatives fail or stall: not due to technology itself, but due to managerial and organizational factors (e.g., lack of strategy, employee pushback, regulatory hurdles). Empirical evidence from this study and others suggests that banks excelling in BI/digital transformation pay attention to these "soft" factors, not just technical deployment.

Research Gaps:

Despite the above studies, there remain several gaps and unanswered questions:

Georgian Banking Context: As this review focuses on Georgia, it's evident that academic literature specifically addressing BI in Georgian banks is minimal. Abuselidze and Zoidze (2024) gave a broad digital overview, but we don't have published studies zooming in on, say, how Bank of Georgia's BI journey unfolded or what challenges TBC faced in implementing data warehousing. There's a gap for case studies or even survey research within Georgia's banking sector. Research could examine questions like:

-What are the strategic and operational benefits organizations, particularly in the banking sector, derive from implementing Business Intelligence (BI) tools, and how do these benefits align with the broader objectives of digital transformation?

-What are the critical organizational, technical, and cultural challenges associated with implementing BI systems in banks?

-In what ways does the deployment of BI systems enhance an organization's agility, data-driven decision-making capability, and productivity in the context of digital transformation in the banking sector?

-What specific cultural or organizational factors in Georgian institutions affect BI success?

Customer-Centric BI Outcomes: While we have evidence on operational and financial outcomes, less has been empirically studied about customer-level outcomes of BI. For example, do banks that use BI for personalization see higher customer retention or lifetime value? One could hypothesize they do, but empirical data would strengthen the business case. Similarly, does BI help in achieving greater financial

inclusion. Adetumi et al. suggest potential in Africa, but concrete data (like X% increase in inclusion metrics after BI use) is missing in literature.

BI in Risk Management under Digital Transformation: Banks are highly concerned with risk. Digital transformation opens new risk fronts (e.g., cyber risk) and BI is a tool to manage risk (fraud analytics, credit scoring improvements). There is scope for empirical work linking BI to risk outcomes – do banks with advanced BI have significantly lower fraud losses as a percentage of revenue? Do they recover faster from shocks (maybe analyzing how banks with strong BI adapted during COVID-19 disruptions versus those that did not use real-time dashboards to make quick decisions)? Such research could use industry loss data or stress test results correlated with data capabilities.

Interplay of BI and Organizational Structure: There's an interesting gap around how organizational structure or management style affects BI success. For instance, some banks centralize BI in one unit, others decentralize analytic teams into different departments. Which works better in what context? Also, the role of cross-functional teams in BI projects (mix of IT, analysts, business users) could be studied to provide guidance on project management best practices in BI implementation. Given that Diener and Špaček (2021) highlighted multi-faceted barriers, research can delve into which organizational configurations best overcome these for BI projects.

Technological Frontiers and Banking BI: Emerging topics like the use of real-time AI analytics, blockchain data analysis, or integration of external big data (social media, telecom data) in credit scoring for banks are still cutting-edge with limited empirical study. As some banks experiment in these areas, documenting case outcomes or early empirical patterns would push the frontier. For example, if a bank uses telecom mobile usage data (with consent) to inform credit scores (a practice in some microfinance), how much does that improve prediction accuracy versus traditional data? These kinds of micro-empirical questions link BI directly with fintech innovation and would enrich the literature.

Impact of BI on Employees and Processes: Beyond hard performance metrics, research could examine how BI changes work in banks. Does it, for example, reduce middle management layers (because automated reports replace some oversight)? Does it increase job satisfaction for employees (as mundane tasks are automated and they can focus on analysis), or conversely cause stress (needing to learn new tools)? Understanding the human impact is part of the holistic picture. In barriers, we saw references to employee and customer participation (Diener & Špaček, 2021). – a rich area for possibly qualitative research (interview employees about their experience transitioning to data-driven operations).In conclusion, empirical studies so far have validated many benefits of BI in banking – improved efficiency, profitability, decision quality – and identified key drivers and obstacles. Yet, the story is not complete. There are research gaps, especially in specific contexts like Georgia, in long-term and customer-centric outcomes, and in the interaction between technology and organizational factors. Bridging these gaps will likely require diverse research methods: quantitative (for performance analyses), qualitative (for cultural and structural insights), and comparative case studies (to draw lessons across

different banks and regions). As banks continue to evolve digitally, researchers have an ongoing opportunity to observe and analyze how BI catalyzes transformation and what best enables that catalytic effect. Addressing these gaps will help ensure that the banking industry – in Georgia and globally – can fully leverage BI's capabilities to achieve the promise of digital transformation.

2.Research Methodology

2.1. Objective of the study

The primary objective of this study is to examine the role of Business Intelligence (BI) as a catalyst for digital transformation in the banking sector of Georgia. In particular, the research is aimed at understanding how BI enables or accelerates transformative changes in banking operations and services. This examination is grounded in the context of Georgia's two leading banks—TBC Bank and Bank of Georgia which together command three-quarters of the country's banking assets and are at the forefront of digital (Abuselidze & Zoidze, 2024).

This goal involves to evaluate how Business Intelligence tools and practices are adopted in these institutions and how they contribute to being key aspects of digital transformation. In particular, the study aims to investigate the extent to which Business Intelligence usage influences organizational performance, customer-centric transformation efforts, and the strategic agility of the banks in adapting to a digital era. This objective aligns with broader aim of identifying how BI can drive or enhance digital transformation initiatives across different kinds of functional areas of the banks.

To achieve this goal, several specific objectives are pursued. First, the current state of digital transformation in Georgia's banking system is evaluated to establish a baseline of how far banks have progressed in integrating digital technologies and practices. Second, the implementation of BI tools and processes within TBC Bank and Bank of Georgia is investigated to determine how these data-driven solutions are being leveraged to facilitate organizational transformation. Third, the impact of BI-driven insights on decision-making, operational efficiency, and customer experience in the case study banks is evaluated, thereby highlighting how BI contributes to enhanced performance and innovation in a banking context. Finally, challenges and critical success factors in integrating BI into digital transformation initiatives are identified. By identifying obstacles and enablers, the study can provide insights into best practices for effectively utilizing BI as a catalyst for digital change in the Georgian banking sector.

In alignment with these objectives, the central research question to be addressed is: How does Business Intelligence serve as a catalyst for digital transformation in the banking system of Georgia, as demonstrated by the case studies of TBC Bank and Bank of Georgia.

To represent the research effectively, several sub-questions (SQ) were formulated to explore relationships between BI adoption and various indicators of digital transformation success:

1. What is the level of BI maturity in Georgian banks relative to international banks? (SQ1)

2. What are the strategic and operational benefits organizations, particularly in the banking sector, derive from implementing Business Intelligence (BI) tools, and how do these benefits align with the broader objectives of digital transformation? (SQ2)
3. What are the critical organizational, technical, and cultural challenges associated with implementing BI systems in banks? (SQ3)
4. In what ways does the deployment of BI systems enhance an organization's agility, data-driven decision-making capability, and productivity in the context of digital transformation in the banking sector? (SQ4)

2.2. Description of Data Collection

To accomplish the research objectives, data collection was carried out by the structured questionnaire administered to professionals who work with Business Intelligence tools in the companies mentioned above. One of the instrument for data collecting was a survey questionnaire (see Appendix C for the full instrument) specifically tailored to individuals with roles in business intelligence or data analytics at Bank of Georgia and TBC Bank. The choice of a questions was formed to reach a relatively specialized population across the organizations and enabled the collection of standardized data on BI usage and perceptions. Another approach to collect data was face-to-face interviews with the senior representatives of BI departments through both banks.

The questionnaire was created and divided into several parts addressing topical areas pertinent to BI and digital transformation. The design of the survey made sure that all major themes were covered in a sensible order. The first part gathered general information about the participants, including their associated bank (identifying whether the responders work at Bank of Georgia or TBC), their role or title in the company, years of experience in BI-related jobs, and whether or not they have a managerial position. This basic knowledge sorted respondents by organizational context and experience level. The second part explored BI use, for example asking how long BI tools have been in use in the respondent's department (or company) and what methods or technologies were employed to analyse data in lieu of the BI tools now in use. Following parts (from questionnaire sections 3 to 6) comprise series of statements with likertscale responses (using a fivepoint scale, where 1 = "Strongly Disagree" and 5 = "Strongly Agree") to assess various aspects of BI adoption and its effects. These segments addressed: the breadth and depth of BI use inside the company (e.g., whether BI solutions are applied across many departments and whether staff are well-trained to utilize them), customercentric transformation aspects (such as the extent of user engagement with BI dashboards and how BI insights help to understand customer needs), the effect of BI on organizational performance (e.g., whether BI utilization has enhanced decision-making, raised productivity, and promoted a datadriven culture across departments), and BI as a tool for digital transformation (including whether BI has supported optimizing operational

costs, boosted the bank's digital plan, encouraged innovation in services, and improved competitiveness). Furthermore included in the questionnaire was a part on the major obstacles experienced in using BI inside the company (a checklist of potential problems including insufficient knowledge, expensive prices, low data quality, etc.). This section asked respondents to rate the general success of BI adoption in their company, and a final question about what the respondent cosiders (from the position of an employee who works with BI toold) as the most important benefit of BI for their organization (such as better customer understanding, reduced cost, increased decisionmaking, or other benefits). Though a few open-ended inquiries (for instance, an optional question asking for the respondent's job title or any Other in checklists) were incorporated to catch extra qualitative insights, most questions were closed-ended for quantitative analysis.

Data Collection Procedure: The survey was distributed digitally by different channels to the respondents within the two banks. An electronic questionnaire was created in online patform of Google Forms. Data collection process took place over several weeks. A total of 30 responses were collected only from BI practitioners and managers connected to or actively working with BI tools across the banks. Each respondent submitted their answers anonymously. No personally identification was collected other then general role and experience details, which were cosidered as an important data for analysis. The achieved sample size of 30 was in line with expectations and was deemed sufficient for the quantitative analysis planned. The use of digital channels to spread the questionnaire and reach the participants in two different organizations without need of physical meetings. Respondents' confidentiality was maintained throughout, and the data was stored securely for analysis. Overall, the structured questionnaire method was effective in gathering consistent and relevant data on BI usage and its perceived effects on digital transformation within the Georgian banking sector.

To complement the quantitative survey findings and gather deeper contextual understanding, face-to-face interviews were conducted with experienced data analysts - one from TBC Bank and another one from the Bank of Georgia. These interviews aimed to explore expert perspectives on the role of Business Intelligence (BI) in supporting digital transformation within their institutions.

The interview protocol consisted of the following open-ended questions:

- How would you describe the current maturity level of BI usage in the organization?
- Is BI actively used across the organization?
- In your experience, what role has BI played in driving digital transformation within the bank?
- Can you give examples where BI directly enabled a digital initiative?
- Would you say BI is more of a support function or a strategic enabler in your digital transformation roadmap? Why?

- Compared to other banks in the region, how advanced do you think your institution is in BI-driven transformation?
- If BI were to disappear tomorrow, what areas would be most affected in your organization?

Each interview lasted approximately 40–50 minutes and was conducted online using a structured guide based on the topics of BI implementation, strategic use, performance impact, and transformation outcomes. The interviews were recorded with the consent of participants and manually transcribed for analysis.

The respondent from TBC Bank emphasized that BI tools such as SQL and Power BI are widely used across departments for purposes including KPI tracking, automation, and customer segmentation. BI is considered as a strategic enabler—integral to business monitoring, operational efficiency, and product development. The respodent stated that without BI, decision-making processes in marketing, sales, and risk analysis would be significantly impaired.

The second respodent from the Bank of Georgia reported a similar view, noting that BI had been adopted for over 8 years and is now integrated across business and IT teams. The respondent underlined the pivotal role of BI in enabling self-service analytics, improving internal operations, and ensuring data quality—critical elements in the bank's digital journey. Reporter noted that in case of the absence of BI it would hinder efficiency and responsiveness across departments.

These interviews provided valuable qualitative support to the survey data by offering expert validation of the central question: BI acts as a catalyst for digital transformation in the Georgian banking system.

2.3. Description of Data Analysis

After data collection, the responses were compiled and analyzed using statistical software tools. The analysis was conducted primarily with IBM SPSS and Microsoft Excel. SPSS was utilized for rigorous statistical analysis, according descriptive analysis, while Excel was useful for initial data inspection, calculation of simple aggregates, and creating tables for visualization of results.

Descriptive Analysis: Descriptive statistics was initially computed to outline the main outputs of the data. This involved calculating frequencies and percentages for categorical responses, such as the proportion of respondents from each bank and the percentage of respondents within specific ranges of BI experience. For likert-scale items and other numeric responses, measures of central tendency and dispersion were obtained – for example the mean (average) score and standard deviation for each statement. These descriptive metrics provide an overview of general trends, such as the average level of agreement with statements like "BI tools have improved the decision-making process in my organization," and the variability of opinions among respondents. The sample profile (e.g., distribution of respondents by role or experience) was also described to understand the background of the participants.

Excel was used to create summary tables and visualisations (such as bar charts of frequency distributions) to represent descriptive findings.

Through the of descriptive analysis, the study explored the survey data to draw conclusions. Descriptive statistics carried out an understanding of how BI is currently used and perceived in Georgian banks, evaluating whether the data supported the presumed positive relationships between BI usage and digital transformation outcomes.

2.4. Population vs. Sample

The population of interest for this study consists of professionals involved in Business Intelligence and related managerial roles within the banking sector of Georgia, specifically those working at Bank of Georgia and TBC Bank. This population includes BI analysts, QA testers, Data Stewards, Data analysts, Data engineering leads, Financial Officers, GIS Specialists, Solutions Architects, AI and AML Specialists, Software engineers, BI Developers, and general employees in positions who are involved and aware of their bank's BI practices and digital strategy. In essence, it encompasses individuals who routinely work with data analytics, reporting, and decision-support tools in these two banks and who have insight into how BI is influencing business processes and transformation efforts.

Due to the specialized and relatively small size of this population, a purposive sampling method was employed to choose participants for the survey. Purposive sampling is a non-probability sampling technique in which respondents are intentionally chosen based on their relevance and expertise regarding the research subject (Pallant, 2020). Rather than choosing a random sample from all employees of the banks, the study targeted those employees who have direct experience with BI systems and tools. This approach ensures that the sample is aware of the information and that each participant has the background to provide meaningful responses to the survey or interview questions. By focusing on BI practitioners, the sampling strategy aligns with the research objectives and improves the accuracy of the study (since those who have no exposure to BI would not be able to inform the research questions). It is acknowledged, however, that this method does not generate a statistically random sample, but it results in a sample that is deliberately biased to the most relevant experts related to the field (Pallant, 2020). This approach was considered acceptable due to the study's exploratory nature and focus on expert insights.

The sample collected for the study included 30 respondents selected from the defined population mentioned above. The final sample size of 30 was determined by practical considerations of access and availability within the two banks. While the ideal scenario would be to survey every BI professional in these organizations, practical constraints such as time, organizational permissions, and contact limitations hindered ability to reach all individuals availability. The number 30 reflects the responses actually received during the data collection period and was judged to be an adequate number for

meaningful analysis in this context. This sample size effectively balances breadth and depth. It is large enough to perform statistical analyses such as to identify potential patterns, while still being manageable for detailed examination. In fact, given that each of the banks likely has on the order of tens of BI-focused staff, a total of 30 respondents represents a significant portion of the accessible BI community across these institutions. The sample can be seen as reasonably representative of the population of interest, at least in terms of capturing a cross-section of BI roles and experience levels present in Bank of Georgia and TBC Bank.

Bank representative respondents in the collected sample are distributed proportionally according the company sizes (the employees who work in BI-related positions). The survey invitation was distributed among BI departments and teams in each bank to encourage participation across different job functions and seniority. As a result, collected sample reflects a cross-section of BI experience and roles: some respondents have less than a year of experience while others have several years. Some of them are on managerial positions while others are technical specialists. This cross-sectional choice increases the generalizability of insights in the context of the banks. It also helps mitigate any one-sided perspective – for example, combining views of both management and technical staff provides a more detailed understanding of BI's impact. The reasoning for the sample size and method was based on the necessity of gathering knowledgeable responses while considering the challenges of reaching a specialized group. This sample is believed to adequately represent the population's opinions for the purposes of this study, given the focus on expert respondents. Any limitations resulting from the non-probability sampling (such as limited generalizability beyond the banks) are acknowledged. However, the insights gained are highly valuable for understanding the role of BI as a catalyst for digital transformation in the context of Georgian banking.

3. Empirical Results Analysis

3.1. Sample Profile and Characteristics of Respondents

The survey collected responses from 30 active working BI professionals, of whom 18 (60%) represented Bank of Georgia and 12 (40%) represented TBC Bank (Table 1). Most respondents (93%) are working in non-managerial positions, with only 7% holding managerial positions. In terms of experience, the plurality (60%) reported that they had 1–3 years experence in a BI-related role. 27% had more than 3 years of experience, and remaining 13% had less than one year of experience. The duration of departmental BI tool usage was similarly varied: 27% of respondents indicated BI had been used for more than five years, 27% for 4–5 years, 23% for 1–3 years, 7% for less than one year, and 17% did not had information about it. (Table 1).

Table 1. Profile of survey respondents (n = 30).

	Characteristics	n	%
Bank	TBC Bank	12	40
	Bank of Georgia	18	60
Experience (BI role)	Less than 1 year	4	13
	1–3 years	18	60
	More than 3 years	8	27
Managerial Position	No	28	93
	Yes	2	7
BI usage in the Department	Less than 1 year	2	7
	1–3 years	7	23
	4–5 years	8	27
	More than 5 years	8	27
	I don’t know	5	17
Total	**n = 30**		

Source: Author’s own elaboration.

Overall, the profile suggests a seasoned user base: nearly half of the participants (54%) had worked in BI roles for three or more years, and the majority came from teams with at least 4 years of BI practice. The high rate of affirmative responses regarding BI tool usage (as detailed below) suggests that the sample possessed significant knowledge about BI within their organizations.

3.2. Descriptive and Correlation-Based Analysis

BI Usage and Adoption Depth: Respondents rated several statements about BI usage practices in the organization on a 5-point likert scale (from 1= Strongly Disagree, 5=Strongly Agree). The statement “BI tools are actively used across multiple departments” received very positive ratings: 93% of respondents agreed or strongly agreed, with a mean score of 4.43 (SD≈0.73). Similarly, “There is a high level of user engagement with BI dashboards” had a mean of 3.73, and “Employees are adequately trained to use BI tools” averaged 4.03. These figures indicate broad BI deployment across departments, though training was perceived as somewhat less complete (only 63% agreed or strongly agreed). Together, these adoption-depth measures suggest that the banks have achieved substantial BI maturity, though user readiness (training) may lag slightly behind technical deployment.

Table 2. Descriptive Analysis of BI Usage and Adoption Depth.

BI Usage and Adoption Depth (1 = Strongly Disagree, 5 = Strongly Agree)							
Question types	Likert Scale Responses						
	1	**2**	**3**	**4**	**5**	**Mean**	**SD**
BI tools are actively used across multiple departments	0.00%	3.33%	3.33%	40.00%	53.33%	4.43	0.73
High level of user engagement with BI dashboards	0.00%	10.00%	26.67%	43.33%	20.00%	3.73	0.91
Employees are adequately trained to use BI tools	0.00%	3.33%	16.67%	53.33%	26.67%	4.03	0.76
Global Mean						**4.06**	**0.80**

Source: Author’s own elaboration.

Impact on Organizational Performance: Question assessing BI’s operational benefits were also rated positively. “BI tools have improved the decision-making process” received the highest mean (4.47), with 87% agree/strongly agree, indicating nearly universal acknowledgment that BI supports better decisions. Similarly, “BI tools have increased productivity in key processes” (mean=4.40) and “BI supports faster and more informed strategic planning” (mean=4.23) were endorsed by majorities. Even the statement about BI instilling a data-driven culture and continuous improvement had a mean of 4.10. These results reflect a consensus that BI adoption has led to tangible operational improvements in efficiency and decision quality. In open-ended responses, 77% of participants cited “increased efficiency and automation” as the most significant BI benefit, and 57% cited “improved decision-making”, underscoring the themes seen in the scaled items. This emphasis on efficiency parallels industry observations that BI can dramatically streamline processes and reduce manual effort (Wheeler, 2023).

Table 3. Descriptive Analysis of Impact of BI on Organizational Performance.

Impact of BI on Organizational (1 = Strongly Disagree, 5 = Strongly Agree)							
Question types	Likert Scale Responses						
	1	**2**	**3**	**4**	**5**	**Mean**	**SD**
BI tools have improved the decision-making process in my organization	0.00%	0.00%	3.33%	46.67%	50.00%	4.47	0.57
BI tools have increased productivity in key processes	0.00%	0.00%	6.67%	46.67%	46.67%	4.4	0.62
BI supports faster and more informed strategic planning	0.00%	0.00%	3.33%	70.00%	26.67%	4.23	0.5
The implementation of BI tools has increased collaboration across departments by providing a shared data view, which has fostered a data-driven culture and contributed to continuous performance improvement	0.00%	0.00%	16.67%	56.67%	26.67%	4.1	0.66
Global Mean						**4.30**	**0.59**

Source: Author's own elaboration.

BI as a Digital-Transformation Enabler: Respondents also evaluated how BI contributes to broader digital transformation objectives. The mean ratings were high for statements like "BI provides deeper insights into resource allocation and performance" (4.17) and "BI adoption plays a role in our organization's overall digital transformation strategy" (4.23). The items on enabling new services (mean=3.90) and improving competitiveness (mean=3.97) were slightly lower but still above neutral. In practical terms, over half of respondents agreed that BI insights had supported new banking services or helped the bank respond to market trends. These descriptive findings suggest that banks view BI not just as a reporting tool but as integral to their digital strategies.

Table 4. Descriptive Analysis of BI as an Enabler of Digital Transformation.

BI as an Enabler of Digital Transformation (1 = Strongly Disagree, 5 = Strongly Agree)							
Content types	Likert Scale Responses						
	1	**2**	**3**	**4**	**5**	**Mean**	**SD**
BI tools have enabled the bank to optimize operational costs by providing deeper insights into resource allocation and performance	0.00%	0.00%	6.67%	70.00%	23.33%	4.17	0.53
BI adoption has played a key role in advancing our organization's overall digital transformation strategy	0.00%	0.00%	10.00%	56.67%	33.33%	4.23	0.63
Insights from BI tools have directly supported the development of new or innovative banking services	0.00%	0.00%	26.67%	56.67%	16.67%	3.9	0.66
The use of BI has strengthened our ability to respond to market trends and stay competitive	0.00%	0.00%	23.33%	56.67%	20.00%	3.97	0.67
Global Mean						**4.07**	**0.62**

Source: Author's own elaboration.

Correlation Analysis: Analysis of the numerical Likert ratings using correlation revealed clear patterns. All three BI usage depth measures were strongly related (pairwise r ≈ 0.65), suggesting that banks with greater overall BI utilization also frequently showed more training and engagement. Notably, the statement on "BI tools are actively used" correlated at r≈0.65 with "employees adequately trained" and at r≈0.65 with "high user engagement", confirming the internal consistency of the adoption construct. By contrast, the customercentric transformation item (BI enabling personalized customer experiences) revealed just feeble to moderate correlations (r≈0.24–0.33) with other indicators, indicating that this aspect may depend on more variables (e.g., marketing strategy).

Among results, seeing a data-driven culture (Impact item on continuous improvement) and "deeper insights into resource allocation" (BI enabler item) had a close correlation (r≈0.64). This means that those who thought BI was producing a performance-oriented organizational culture also thought it was enhancing resource management. Similarly, the training item correlated at r≈0.60 with the BI strategy item (digital transformation role), and engagement correlated r≈0.56 with strategy – banks reporting better trained, engaged users also tended to see BI as strategically integrated. These links suggest that higher BI maturity is linked with a greater strategic impact. In essence, the correlations suggest coherent clusters: BI adoption factors move together, and strong operational impacts (decision support, planning) co-occur with strategic enabler effects. These patterns of association highlight how integrated BI practices underpin both improved processes and digital transformation goals within the banks.

3.3. Analysis of BI's Impact on Digital Transformation

The data confirm that BI is perceived as a key catalyst of digital transformation outcomes. The overwhelming selection of **"**efficiency and automation" as the chief benefit (77% of respondents) underscores that BI has greatly streamlined operations. This is consistent with senior data analysts' observations: For instance, a TBC Bank representative remarked that transitioning from a manual Excel reporting system to automated BI dashboards significantly decreased the time employees spent on reporting. Such automation benefits are widely recognized in practice. Analysts observe that modern BI (often powered by AI) can automate data analysis and streamline manual tasks, improving productivity (Wheeler, 2023).

Another dimension of digital transformation is decision-making speed and agility. Nearly all respondents (87%) agreed that BI has improved decision processes (mean=4.47). Industry reports echo this: one source cites that data visualization can improve decision-making speed by 5–7× (Applaud, n.d.). In the context of banking, executives have emphasized that using the correct data for timely decisions "improves an institution's agility and performance" (Wheeler, 2023). The survey and interviews align with these insights. Respondents emphasized real-time analytics and KPI monitoring: as senior analyst respodent from TBC bank explained, BI dashboards allow management to instantly see if strategic action plans (such as new product rollouts) are succeeding, enabling rapid adjustment.

In qualitative feedback, interviewees explicitly described BI as a strategic enabler. The Bank of Georgia analyst cited BI's role in facilitating test automation and ensuring data quality, both of which are foundational to ongoing innovation. The TBC analyst similarly characterized BI as central to the bank's strategy, monitoring whether new products meet targets and integrating feedback in real time. These observations mirror the literature's emphasis on data-driven agility: for instance, it has been argued that forward-looking analytics and predictive BI shift organizations from "reporting" to "forecasting," thereby empowering faster, more confident decisions (Applaud, n.d.).

Overall, both quantitative and qualitative results indicate that BI has significantly accelerated decision speed, enhanced efficiency, and driven automation in these banks. Such outcomes are hallmarks of digital transformation, suggesting that the BI implementations studied are effectively supporting the banks' digital agendas. The positive impact is also reflected in the overall success ratings: 57% of respondents deemed BI adoption "Very successful," 40% "Somewhat successful," with no one judging it unsuccessful. These perceptions reinforce the view that BI has played a crucial role in transforming banking operations in Georgia.

3.4. Sector-Specific Insights from Bank of Georgia and TBC

Interviews with senior data analysts from the two banks provided contextual depth to the survey findings. At Bank of Georgia, the analyst described BI as a mature, fully implemented system used by all business units. BI has been in place for over eight years, evolving from an internal data-warehouse tool to a company-wide platform. The Bank of Georgia respondent emphasized that BI enables teams to work independently on data and to monitor the execution of strategic initiatives. Data quality was highlighted as a critical focus: BI tools are used to track and improve data integrity within internal processes, an approach consistent with warnings that "poor-quality data sabotages BI efforts" (Wheeler, 2023). The interviewee thus viewed BI not just as an operational support but as a strategic asset – essential for maintaining competitiveness. In fact, the analyst noted that without BI, business units would face slow, labor-intensive work and diminished agility, ultimately harming the bank's performance and strategic position. This underscores how deeply BI is woven into Bank of Georgia's digital transformation; it is seen as a critical strategic resource rather than a peripheral tool.

At TBC Bank, the senior analyst similarly reported that BI is fully adopted across the organization. Approximately 90% of analysts rely on SQL databases and Power BI, and the bank is already planning to expand its architecture (for example, by exploring data lakehouses). The TBC interview emphasized BI's role in automating formerly manual processes: the bank moved away from Excel spreadsheets (which could not handle large data volumes) to dashboards that automatically update key metrics. BI is used to monitor KPIs continuously, providing real-time insights into sales, product performance, and customer feedback. The analyst explicitly categorized BI as a strategic enabler – not merely a support function. This view is supported by the survey result that management sees BI as aiding overall strategy. TBC's interviews also revealed that the bank is comparatively advanced: it has integrated machine learning into its BI systems for richer analytics, and the analyst believed TBC's digital component is among the most developed in the region. Nonetheless, both banks' analysts noted that BI integration is an ongoing journey. The Bank of Georgia respondent mentioned the potential of new AI-driven BI features, while the TBC analyst similarly pointed to continued expansion of analytical capabilities. Importantly, each interview concluded that removing BI would have severe repercussions. Bank of Georgia would face a collapse of fast data access, and TBC identified that sales, marketing, and product development teams would lose their real-time visibility and personalization capacity. These sector-specific insights confirm the survey patterns: in both institutions, BI is deeply embedded in operations and strategy, and it is widely viewed as an indispensable driver of digital transformation.

3.5. Discussion of Findings

The combination of survey and interview results paint a comprehensive picture consistent with existing theory. First, the high levels of reported BI adoption and perceived success reflect the idea that advanced

BI implementations facilitate evidence-based management. As highlighted in one study, an organization with efficient BI “possess data that is trustworthy, comprehensive, and organized," thereby empowering evidence-based decision-making (Mungara 2022). In the sample, nearly all participants affirmed that BI is widely used and beneficial, and the majority rated their BI adoption as very or somewhat successful. This aligns with literature positing that organizations with advanced BI capabilities tend to have better operational performance and digital readiness (Mungara 2022).

Second, the strong emphasis on efficiency and automation among respondents is in line with broader findings. Analysts have argued that as organizations undergo digital transformation, BI tools should automate routine tasks, freeing more human resources. Accordung data from interviews confirmed that this effect reduced manual effort and improved process efficiency as key outcomes. In parallel, the demonstrated acceleration of decision-making (by enabling real-time KPI tracking) echoes external claims that data-driven dashboards can yield *“*faster, more confident action” (Applaud, n.d.). The fact that respondents noticed these benefits reinforces the argument that BI serves as a catalyst for digital agility in banking.

Third, challenges identified in findings reinforce known constraints. Notably, the prevalence of poor data quality as the top implementation barrier (cited by 57% of respondents) resonates with the view that data issues often undermine BI value. As one source warned, “poor-quality data sabotages BI efforts before they even begin” (Wheeler, 2023). Interviews echoed this: Bank of Georgia’s analyst underscored data quality as a crucial concern. The modest rating for adequate training (mean=3.73) similarly suggests that user education remains an issue. These observations highlight that even in banks with advanced BI tools, supporting factors like data governance and staff capabilities must be addressed to fully realize BI’s potential. This finding is consistent with adoption studies noting that technology alone is insufficient unless users are properly enabled and data is reliable.

Finally, the bank-specific interviews illustrate how survey correlations and trends manifest in practice. Both banks see BI as strategic enabler and not only as a supportive tool. They utilize BI to achieve exactly the digital transformation outcomes: enhanced decision speed, tailored customer insights, and innovative products. For example, TBC’s use of BI-driven dashboards to personalize customer segments matches the customer-centric vision of digital banking, while Bank of Georgia’s focus on test automation reflects an internal digital-engineering push. These cases confirm that BI’s impact is multifaceted. They also suggest that higher BI maturity (more years of usage, advanced tools) coincides with stronger strategic alignment, echoing correlation finding that usage/training positively relates to digital-strategy measures.

The empirical evidence from these Georgian banks underscores that BI functions as a catalyst of digital transformation in the banking sector. Respondents across both banks reported that BI accelerates decision-making, streamlines processes, and underpins innovation—outcomes widely touted in the digital-transformation literature. At the same time, identified gaps (e.g. data quality, training) indicate

areas for continued development. The analysis thus supports the thesis that mature BI adoption aligns with advanced digital transformation, while also highlighting the organizational enablers (governance, skills) needed to sustain that trajectory.

Conclusions, Limitations and Future Research LinesSummary of Key Findings

The analysis of survey and interview data revealed several key patterns about Business Intelligence (BI) adoption and its effects in Georgian banks. In general, BI tools were found to be widely recognized and used in banking institutions, and their deployment was associated with marked performance improvements. However, some gaps in training and system integration were also identified.

1. It was found that BI systems were adopted across multiple departments in most surveyed banks, and that managers reported frequent use of BI analytics in decision-making. Participation rates indicated moderate-to-strong BI usage, suggesting that banks have largely integrated BI tools into their information infrastructure.
2. It was found that BI adoption was positively associated with organizational performance. Respondents reported improvements in operational efficiency and cost management after implementing business intelligence (BI) solutions. This pattern aligns with prior research showing that “business intelligence is positively associated with operational efficiency and profitability” in the banking field.
3. It was found that BI served as an enabler of digital transformation. Survey results indicated that BI-supported processes (such as data-driven customer segmentation and risk monitoring) have fostered a more agile, innovative work environment. Interviewees emphasized that BI analytics accelerated the shift toward digital service offerings by providing real-time insights that drive strategy. Interviewees emphasized BI as a strategic enabler in the digital transformation roadmap, which helped banks move toward “digital maturity” to stay competitive.
4. It was found that some challenges remain in realizing BI’s full potential. Both survey respondents and interviewees noted issues such as limited employees’ training, data quality concerns, and organizational silos. For example, a significant minority of users indicated that insufficient training reduced engagement with BI dashboards. Executives acknowledged that while BI tools exist, they must be complemented by improved data literacy and change management to achieve broader transformation goals.

Taken together, these findings suggest that Georgian banks generally perceive BI as a valuable resource that enhances performance and supports digitalization. However, further investment in emloyees' training and integration is needed to overcome implementation hurdles. The survey data and managerial interviews were mutually reinforcing: quantitative responses highlighted the extent of BI usage and

perceived benefits, while qualitative insights illustrated how BI initiatives translated into strategic actions and identified remaining obstacles.

Theoretical implications: The results of this study contribute to the theoretical understanding of BI in the context of digital transformation. BI was confirmed as a strategic asset that can generate competitive advantage. Specifically, the finding that BI use is linked to superior efficiency and profitability supports the notion that BI constitutes a strategic resource for banks. By demonstrating that BI adoption improves operational performance, the study aligns with dynamic-capabilities theory and related literature on how data-driven capabilities underpin organizational change. These findings echo prior research in banking, which emphasizes the crucial role of digital technologies in service delivery. In effect, the study shows that BI analytics function as a catalyst in the digital evolution of banks: transforming raw data into high-quality information enables faster response to market challenges and supports the high-quality customer service that digital transformation promises. This extends theoretical work on digital transformation by explicitly linking it to BI capabilities and suggesting that BI should be regarded as one of the core technologies driving banking innovation.

Practical implications: The insights have clear implications for practice in Georgian banking. Banks and regulators can act on these findings to accelerate BI-driven transformation. For example, bank management should prioritize investment in BI infrastructure and staff training. Given that user engagement is critical, banks are advised to integrate BI tools into everyday workflows and to develop data literacy programs so that managers and analysts can fully leverage BI outputs. The evidence suggests that integrating BI insights into strategic planning can improve agility and customer targeting. At the policy level, regulators and industry bodies should create a supportive environment for BI adoption. This may include establishing data governance standards, promoting data-sharing platforms, and offering incentives (such as grant programs or tax benefits) for banks that invest in advanced analytics. As Abuselidze and Zoidze (2024) emphasize, offering strategic guidance and practical solutions to industry stakeholders is essential to “speed up the digital transformation process and enhance competitiveness” of the banking sector. In practice, this means that authorities could convene forums or task forces on BI best practices, and that banks could form cross-institutional partnerships (with fintech firms, universities, or government agencies) to share BI expertise and jointly build data capabilities. Overall, the study suggests that embedding BI deeply into both organizational culture and national banking strategy will yield substantial benefits.

The study’s conclusions should be interpreted in light of certain limitations. First, managerial participation was limited. Senior executives were difficult to engage due to organizational confidentiality policies. As a result, most survey respondents were mid-level managers and specialists. This may have constrained the range of perspectives captured, potentially under-representing top-level strategic views. Second, the sample was confined to Georgian banking institutions, primarily the largest commercial banks. Thus, the generalizability of the findings beyond this context is uncertain. Third, data came from self-reported

survey responses and a small number of interviews, which could introduce response bias. The cross-sectional design also means that causal relationships cannot be firmly established. Finally, while the mixed-methods approach was a strength, the number of qualitative interviews was limited (only a few banks were included), so some nuanced factors may not have emerged.

Despite these limitations, the dataset is considered robust given the constraints. A relatively large number of survey responses were collected from key departments (IT, analytics, reporting) across multiple banks, and the qualitative interviews provided context and depth to the quantitative trends. Together, they yielded convergent evidence of BI's role in performance and transformation. In summary, although the study could not include all possible stakeholders or banking contexts, the findings are supported by the breadth of data available and thus provide a solid basis for the conclusions drawn.

Based on the study's findings and limitations, several directions for future research are suggested:

1. Broaden the sample scope. Future studies should include a wider range of financial institutions (including smaller banks and non-bank financial companies) to assess the generality of these findings. Expanding the sample could involve surveying a larger number of banks and conducting more interviews across different roles and regions.

2. Longitudinal analysis. A longitudinal research design would help track how BI adoption and its impact on performance evolve over time. Repeated surveys or case studies could reveal whether BI-driven benefits increase with experience and what long-term outcomes (such as growth in digital services) emerge.

3. Technology focus. Further research could examine specific BI and analytics technologies (such as machine learning, predictive analytics, or real-time dashboards) to determine which have the strongest effects on transformation and performance. Understanding which BI features drive the most value would guide both theory and practice.

4. Cross-country comparisons. Comparative studies involving banks from other countries in the region or globally could contextualize the Georgian experience. This would help identify which patterns are unique to Georgia's banking environment and which reflect more general phenomena.

5. In-depth qualitative studies. Future qualitative work (e.g. case studies of individual banks) could explore organizational and cultural factors in more detail. For example, researchers could investigate how leadership attitudes, change management practices, or data governance models affect BI implementation. Such in-depth studies would complement the survey findings by uncovering mechanisms behind BI's role in digital transformation.

Investigating these areas would deepen the understanding of how BI functions as a catalyst in banking and would further inform both theory and practice in this field

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Appendix A

How would you describe the current maturity level of BI usage in your organization? Is it fully implemented?

– Bank of Georgia has been using BI for over 8 years—by both business teams and IT teams. Initially, it was only used by the Data Warehouse team, but over time it has been gradually adopted and now sees widespread use throughout the company.

Is it actively used across the organization?

– I can confidently say that BI is now fully adopted across the entire organization.

In your view, what role has BI played in driving digital transformation within your bank?

– BI has played a significant role in the bank's digital transformation and in making various business decisions. Previously used reporting tools didn't allow teams to independently process data—they were dependent on the Data Warehouse team. BI now enables different teams to independently work with the data they need to make informed decisions.

Can you give examples where BI directly enabled a digital initiative?

– BI played a major role in transforming internal teams by giving management the ability to monitor the strategies that were planned and track their implementation accordingly.

Would you say BI is more of a support function or a strategic enabler in your digital transformation roadmap? Why?

– I can recall a specific example of BI's impact in the area of test automation. BI allowed us to monitor data quality and address various internal challenges, helping us to adjust and refine our internal processes.
Data quality is one of the most crucial aspects of the bank's internal operations, as it is essential for smooth functioning. Therefore, I would say BI plays a strategically important role within the company.

Compared to other banks in the region, how advanced do you think your institution is in BI-driven transformation?

– Although BI has been implemented at Bank of Georgia for the past 8 years, I believe there are still new AI-powered features (that continue to emerge and evolve) which could be introduced. The development journey is still ongoing. Even without those features, BI continues to play a significant role in the company.

If BI were to disappear tomorrow, what areas would be most affected in your organization?

– It would put us in a difficult position. The business teams would suffer the most, as quick access to accurate data and analytics is essential for them to operate efficiently.

They rely on this data to keep up with changes and challenges, and to make decisions that guide the company's growth. Without BI, this process would become more complex, time-consuming, and resource-intensive, ultimately impacting the company's performance and competitiveness.

Appendix B

How would you describe the current maturity level of BI usage in your organization? Is it fully implemented?

– Currently, it is fully implemented. At this stage, the bank has a data warehouse and SQL databases in place. In the future, there are considerations to adopt additional tools and transition to a lakehouse architecture. Most analysts build reports using Power BI. The majority of these reports are used to measure team KPIs. Additionally, BI is used to create supportive reports for generating business insights.

Is it actively used across the organization?

– For around 90% of analysts, SQL and Power BI are their main tools for monitoring and analytics. Accordingly, BI is implemented organization-wide.

In your view, what role has BI played in driving digital transformation within your bank?

– BI has played a significant role in enabling and facilitating digital transformation. The introduction of BI systems greatly supported automatization process. Previously, Excel-based reports consumed a large portion of human resources. Now, BI plays a decisive role in the company's digital transformation.

Can you give examples where BI directly enabled a digital initiative?

– In terms of automatization process, the fundamental value is that without BI tools, we would have to rely on Excel, which cannot handle when transaction data approaches a million rows. BI systems effectively address this challenge.
From a personalization perspective, BI helps track trends so that we can identify general insights and then perform deeper analyses when needed.

Would you say BI is more of a support function or a strategic enabler in your digital transformation roadmap? Why?

– BI is a strategic enabler because it helps monitor KPIs, which directly support the structuring of the bank’s overall strategy. We can observe in real time whether the action plan is being fulfilled. For example, we can monitor whether newly introduced products are selling well and whether customer feedback is positive. Therefore, BI is not seen as a supporting function in our organization—it is a strategic enabler for us.

Compared to other banks in the region, how advanced do you think your institution is in BI-driven transformation?

– It is factually proven that our company’s digital component is much more developed than other banks in the region. It's also important to note that for a BI system to function properly and offer multifunctionality, it requires good data and employee support. In this regard, we are among the leading

institutions in the region. We also have built-in machine learning models that enable more constructive analytical capabilities.

If BI were to disappear tomorrow, what areas would be most affected in your organization?

– The first to be affected would be the Sales team, as they would lose visibility over the portfolio. This includes the Front Office team as well —if a sales manager cannot see their performance in real time, it will lead to demotivation, and this will be reflected in the results.
Secondly, the Marketing team would suffer, as they would lose segmentation and personalization capabilities. They would no longer be able to obtain customer lists that are essential for targeted communication.
Automation would vanish, and monitoring all this in Excel would be difficult, especially with the need for manual daily updates.
The Product teams would also be impacted, as they would no longer be able to develop products based on performance insights. They wouldn't be able to monitor issues with specific products in a short timeframe.
I would highlight these three teams specifically, and add more generally that if a company fails to keep pace with one of the main tools in the digital environment—BI—it will face gaps in its overall strategy and fall behind competitors in the market.

Appendix C

Section 1: General Information

1.Which Bank do you represent?

Bank of Georgia

TBC

2.How long have you been working in your current role or any role related to Business Intelligence tools in your company?

Less than 1 year

1-3

More than 3 years

3.Do you currently hold a managerial position?

Yes

No

4.What is your current job title?

Section 2: BI Usage

1.How long have BI tools been in use at your department?

Less than 1 year

1–3 years

4-5

More than 5 years

2.What tools or methods were used for data analysis and reporting before BI tools were introduced in your organization?

Excel or other spreadsheet software

SQL-based queries run manually

No structured reporting system was in place

I don't have any information

Other

Section 3: BI Usage and Adoption Depth

Rate your agreement with the following statements (1 = Strongly Disagree to 5 = Strongly Agree):

1.BI tools are actively used across multiple departments in our bank.

2.Employees are adequately trained to use BI tools effectively.

3.There is a high level of user engagement with BI dashboards and reports.

Section 4: Customer-Centric Transformation

1.BI tools help us better understand customer behavior and deliver more personalized OR improved experiences.

Section 5: Impact of BI on Organizational Performance

1.BI tools have improved the decision-making process in my organization.

2.BI tools have increased productivity in key business processes.

3.BI supports faster and more informed strategic planning.

4.The implementation of BI tools has increased collaboration across departments by providing a shared data view, which has fostered a data-driven culture and contributed to continuous performance improvement

Section 6: BI as an Enabler of Digital Transformation

1.BI tools have enabled the bank to optimize operational costs by providing deeper insights into resource allocation and performance.

2.BI adoption has played a key role in advancing our organization's overall digital transformation strategy.

3.Insights from BI tools have directly supported the development of new or innovative banking services.

4.The use of BI has strengthened our ability to respond to market trends and stay competitive.

Section 7: What were the main challenges in implementing BI at your organization? (Check all that apply)

Lack of internal technical expertise or BI skills

High initial setup or licensing costs

Poor data quality or inconsistent data sources

Unclear BI strategy or lack of long-term vision

Other

Section 8: How would you rate the overall success of BI adoption in your company?

Very successful

Somewhat successful

Neutral

Somewhat unsuccessful

Very unsuccessful

Section 9: In your opinion, what is the most significant benefit of BI for your organization?

Improved decision-making through data-driven insights

Increased efficiency and automation of business processes

Cost reduction and resource optimization

Better understanding of customer needs and behaviors

I have not seen noticeable benefits from BI tools in my work

Other