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Design, opportunities, and challenges of a digital credit process

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Open Banking and automated transaction analysis in the digitalization of business banking: Design, opportunities, and challenges of a digital credit process.

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ABSTRACT:

In the digital age, banks must urgently transform their traditional lending processes. This necessity is intensified by the growing competition from digital providers and customers' increasing expectations for efficiency and speed in financial services. Particularly in the business banking sector, traditional credit processes are often characterized by lengthy processing times and inefficient manual procedures, significantly limiting banks' ability to respond promptly to customer inquiries.

This paper examines the role of open banking and automated transaction analysis as key factors in the digital transformation of lending. By integrating real-time data and advanced analytics, banks can make more informed credit decisions and greatly enhance customer satisfaction. At the same time, the risks and challenges associated with implementing these technologies, particularly regarding data protection, regulatory requirements, and technical infrastructure, are critically assessed.

This investigation's findings provide valuable insights for financial institutions striving to remain competitive in a rapidly changing digital environment and underscore the need to rethink traditional lending processes fundamentally.

KEYWORDS:

Open Banking, PSD2, FinTech, Business Banking, Digital Lending, Business Processes, Digital Transformation

JEL classification: z.B JEL: G20, G21, L86, M15, O32, O33

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Introduction

The digital age and the rapid expansion of the internet are vital megatrends shaping the 21st century, driving significant transformations across multiple sectors of society. The digital revolution has already impacted many industries. For instance, traditional print media, including newspapers and magazines, face declining circulation and sales, as much of their content is now freely accessible online. Axel Springer CEO Mathias Döpfner highlighted this issue with his statement, "We are afraid of Google," emphasizing the current challenges (Schmidt, 2014).

The impact of digitalization extends beyond the media and retail sectors and is now reaching the banking industry. In the 1990s, Bill Gates cautioned the banking sector about emerging competitors from the ICT industry with his statement, “Banking is necessary, banks are not.” This highlights the significant challenges traditional banks face. Antony Jenkins, the former CEO of Barclays, expressed a similar viewpoint in November 2015 when he referred to the impending "Uber moment" for the banking industry. He cautioned that traditional banks risk becoming mere capital-providing utilities, operating in a heavily regulated and less profitable landscape, something shareholders are unlikely to accept (Ehlerding & Liesenkötter, 2017). Jenkins also emphasized, "In the end, these pressures will force large banks to automate much of their business" (Williams-Grut, 2015). He argued that the current climate requires banks to embrace automation and digitization. The financial services sector has recently substantially transformed and is fueled by rapid technological progress and shifting regulatory frameworks.

One of the most transformative developments in this sector is the advent of Open Banking, a concept introduced by the Payment Services Directive 2 (PSD2) in the European Union. Open Banking mandates that banks provide third-party providers with secure application programming interfaces (APIs) to access consumer banking, transactions, and other financial data. This initiative aims to foster innovation, enhance competition, and improve the services available to consumers and businesses.

Open Banking enables automated transaction analysis, which presents a significant opportunity to revolutionize credit processes in business banking. Banks can gain a more accurate and comprehensive understanding of a client's financial status by leveraging real-time data and advanced analytics. This can lead to more informed credit decisions, quicker turnaround times, and lower default rates. However, integrating these technologies also presents several challenges, including ensuring data security, maintaining regulatory compliance, and managing the substantial investment in technology infrastructure.

The digitalization of banking services, particularly in business banking, has become a critical area of focus for financial institutions. Traditional credit processes in business banking are often characterized by lengthy approval times, extensive paperwork, and a reliance on historical financial statements. These processes can be inefficient and may not fully capture a business's financial health and creditworthiness. In an increasingly fast-paced and data-driven world, there is a pressing need to streamline these processes to enhance efficiency, reduce costs, and better serve corporate clients.

This paper examines the current state of corporate banking processes against the backdrop of digital transformation. Its aim is to conceptualize and assess the opportunities and risks of a digital credit

process based on transaction analysis enabled by Open Banking technology. The article intends to contribute significantly to digitalizing business banking at credit institutions.

Status quo of lending business and processes

The lending sector is a cornerstone of banks' corporate client operations, accounting for approximately 70% of net interest income, translating to €65.1 billion (zeb, 2022; Deutsche Bundesbank, 2022). Banks provide various loan products, including real estate financing, Lombard loans, and working capital loans. Loans are essential for refinancing, allowing borrowers to meet financial obligations without using their funds. However, increasing competition is pressuring profit margins in this sector (Deutsche Bundesbank, 2022).

Despite some improvements in loan processing and portfolio management, credit application processing often remains lengthy and manual, resulting in response times ranging from two days to four weeks (PWC, 2017). The requirement for various documents, frequently exchanged in analog formats, complicates the process and negatively impacts customer experience, increasing the potential for errors (Eichermüller, 2019; Brandt & Rautzenberg, 2020).

While there has been a trend toward digitization and automation, these advancements are mainly observed in smaller commercial loans, with limited digitalization in the corporate lending sector (Kern et al., 2017). Additionally, traditional banks face significant challenges in integrating IT systems effectively, which often become bottlenecks instead of enablers for necessary process changes (Spath et al., 2008).

The given challenges hinder the key success factors of speed and efficiency of credit processes. The demand for quicker processing times is growing alongside technological advancements, while high processing times and costs further reduce profit margins. A fundamental restructuring of business banking lending is required, particularly in creditworthiness evaluation, to meet the growing need for tools that quickly signal financial health declines (Stehmann, 1999; Berlandi, 2000). Furthermore, traditional credit scoring methods need enhancements to improve the assessment of credit processes and default risks, as reliance on static data can lead to misjudgments (Grunwald & Grunwald, 2008; Schmoll, 1992).

Organizational Obligations and Regulatory

Banks face special organizational obligations, particularly in reducing the complexity of the lending business, which arises from the asymmetrical information distribution between banks and borrowers and the heterogeneous tasks involved (Ehlerding & Liesenkötter, 2017). Regulatory requirements, including those from the German Banking Act and the Minimum Requirements for Risk Management (MaRisk), significantly influence credit processes' structural and procedural organization, emphasizing the need for clear roles and responsibilities to avoid conflicts of interest (BaFin, 2017).

IT systems play a critical role in process organization, and regulations highlight banks' need to outline future IT organizational structures based on their business activities (BaFin, 2017). Effective data management and risk modeling are also essential for informed credit decisions, requiring standardized data practices and continuous data quality monitoring. Additionally, banks must assess the appropriateness of models used in their credit processes and regularly validate their results (BaFin, 2023).

It should be noted the (traditional) credit process consists of several value-adding activities, beginning with a customer's financing request and including credit analysis, approval, and monitoring (Ade & Moormann, 2004). Creditworthiness analysis occupies a significant and time-consuming portion of the process. Traditional instruments, such as balance sheet analysis, have inherent weaknesses that lead to long processing times. However, this process often lacks consistency and is subject to high levels of subjectivity, impacting its efficiency (Ade & Moormann, 2004). The credit decision, which requires votes from both front and back offices, is crucial and involves a material plausibility check to ensure objectivity (BaFin, 2017).

A simplified approach to credit approval may be applied for smaller exposures. At the same time, a robust organizational framework is emphasized to ensure practical creditworthiness assessments, particularly given the historical significance of this function for banks (Klotz, 1993; Eller et al., 2010). The overall credit process must be well-defined and executed to ensure that lending decisions are timely and accurate.

Focus on Technology: Digitalization and the Role of Open Banking

Digitalization is a significant challenge for the banking sector, encompassing technical transformations to increase efficiency and broader societal changes (Pertl, 2019; KPMG, 2017). Open Banking has become a crucial driver of innovation, enabling third-party developers to access financial data via APIs. This facilitates real-time data sharing, openness through APIs, and customer control over their data, thereby transforming the financial industry (Malyshev, 2024). The sector is rapidly expanding, driven by consumer demand for personalized financial management and innovative solutions.

PSD2 marks a significant advancement in European payment transactions. It aims to foster competition by allowing non-traditional banks and fintech firms to enter the market (European Union, 2007). It promotes innovative payment solutions while ensuring consumer protection and data security. As banks adapt to PSD2, they face increasing pressure to innovate and enhance their IT systems for seamless data exchange (Korschinowski et al., 2017). Implementing Open Banking requires a robust architecture involving key players such as third-party providers and account-servicing payment service providers (Marcoli, 2018).

To succeed, banks need to transition from monolithic systems to agile microservice architectures, allowing them to respond quickly to market changes. This shift is essential for effectively utilizing the new capabilities offered by Open Banking.

In addition to Open Banking, digitalization represents a transformative force in business banking. Customers demand faster and more convenient solutions, prompting banks to innovate amidst competition from technology firms and specialized FinTech companies. AI is increasingly integral to

this transformation, enhancing credit decision-making and management by analyzing historical data for informed lending decisions (Buxmann, 2019). Ethical considerations regarding algorithm transparency must also be addressed to build trust in these technologies.

Overall, the interplay of these technological advancements is reshaping the financial landscape and offering significant opportunities for banks and customers.

The Digital Credit Process

The previous chapters of this article have highlighted the complexity, challenges, and multilayered nature of the credit process in business banking. Credit processes need to be redesigned and digitized with a prototype application to improve speed and efficiency while reducing redundancies and the time from application to disbursement. The focus is on providing fast data availability and processing to expedite the credit decision-making process and analyze creditworthiness.

Figure 1 Digital Credit Process

Automated transaction analysis is central to this transformation, and technology, such as Open Banking and access to account transactions, can realize it. A fully digitalized and generic credit approval process will be created, adaptable to various credit types, and function as a microservice.

The credit process for corporate customers begins with recording customer and application data, gathering all relevant information about the company and the specifics of the loan request. The next step involves accessing the company's account, where the bank, with the company's consent, obtains insight into account transactions and balances to gain a comprehensive view of the company's financial situation. Access can be granted through various means, such as online banking or secure APIs.

The bank then analyzes the account data, examining income, expenditures, recurring payments, and overall account history. Additional information from other sources may also be integrated to provide a more complete assessment. Based on this analysis, the bank makes a credit decision, which includes evaluating the company's creditworthiness, performing risk assessments, and determining loan conditions such as interest rate, term, and amount.

After the credit decision, the KYC (Know Your Customer) process begins, which is more extensive for corporate clients than individual customers. This process verifies the identities of the company and its beneficial owners, examining corporate documents like commercial register excerpts and identification documents. This thorough review aims to prevent money laundering and fraud.

The final step in the credit process is implementing a Qualified Electronic Signature (QES), which allows the loan agreement to be signed digitally and legally binding. The QES ensures the authenticity and tamper-proof nature of the signature, enhancing efficiency and security throughout the process. Collectively, these steps establish a structured and secure approach to processing and approving loan applications for corporate clients.

Technological Components and Architecture

The XS2A (Access to Account) functionality lets banks retrieve account transaction data directly from customers. This access allows banks to compile a holistic view of a customer's financial standing, integrating data from multiple sources, including bank transactions. Customers authenticate their accounts through a secure interface, providing the necessary access credentials. Upon successful login, the bank transmits the transaction data to an Account Information Service Provider (AISP) in a structured format, typically JSON. This raw data includes essential information like account balances, transaction dates, and descriptions, setting the stage for detailed financial analysis.

Account data offers distinctive properties that enhance its value for assessing creditworthiness. Key characteristics include:

- Real-Time Updates: Continuous posting of transactions ensures that banks can access the most current data.
- Low Manipulation Risk: The inherent nature of transaction data makes it difficult for borrowers to distort their financial information, aside from extreme fraudulent activities.
- Cost Efficiency: Since transaction data is automatically generated during financial activities, banks incur minimal additional costs in data collection.
- Comprehensive Variables: The data provides various financial indicators, such as highest and lowest balances, average transaction amounts, and credit utilization rates.

These variables enable banks to build accurate profiles of customer behavior and financial health, aiding in better risk assessment.

ACCOUNT ANALYSIS AND TRANSACTION CATEGORIZATION

An AI-driven system facilitates the process of analyzing and categorizing account transactions. This system begins by inputting transaction lists containing essential data points for analysis. Various machine learning techniques—such as linear regression and support vector machines—are employed to uncover patterns in customer spending and income behavior. Alongside AI analysis, a categorization tree with over 300 predefined tags helps classify transactions into meaningful categories (e.g., income types and spending categories). This dual approach increases the accuracy of transaction classification and enhances the depth of financial analysis, allowing banks to assess risk factors more thoroughly.

DATA ENRICHMENT

Following categorization, the data enrichment phase enhances understanding of customer financial situations. Using a structured process, the categorized data is analyzed through predefined logic modules that assess various aspects, such as income sources, expenditure patterns, and liabilities. This module-based approach lets banks derive insights into customers' liquidity and financial health. Banks can proactively address potential risks by identifying patterns, such as frequent overdraws or irregular payment behaviors.

AUTOMATED TRANSACTION ANALYSIS

Integrating Open Banking and automated transaction analysis marks a significant evolution in credit processes. Real-time access to transaction data allows banks to conduct detailed assessments of a customer's creditworthiness. Automated transaction analysis speeds up decision-making and enables more accurate risk evaluations based on up-to-date financial behavior rather than outdated historical data.

This automated analysis leverages predictive algorithms that assess future cash flows and identify potential default risks, facilitating proactive risk management. Moreover, implementing computerized systems minimizes human error and improves efficiency, allowing banks to process loan applications swiftly—often within minutes—thereby enhancing the overall customer experience.

By utilizing these advanced technologies, banks can significantly improve the accuracy of their credit scoring models. Algorithms that analyze transaction data can provide insights into customer behavior that traditional credit scoring methods may overlook. For instance, the automated analysis can reveal early warning signals, such as declining average balances or increasing utilization of credit limits, which indicate financial distress. This proactive approach helps banks manage risk more effectively and create tailored credit solutions that reflect individual customer needs.

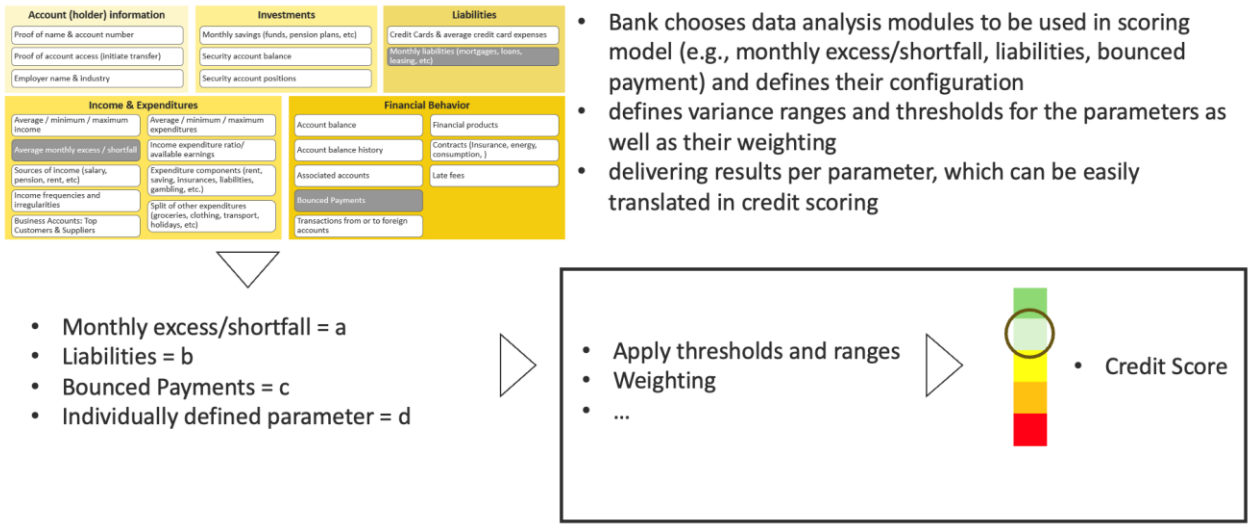

Figure 2 The Way from Analysis to Credit Score

In summary, combining Open Banking, AI, and automated transaction analysis revolutionizes the lending landscape, enabling banks to operate with greater agility, enhance customer satisfaction, and improve their financial offerings.

Opportunities of the Digital Credit Process

The previous chapters have thoroughly explored the workings of Open Banking and data analysis, emphasizing the significance of the PSD2 framework in the financial industry. This results in several opportunities.

The introduction of APIs facilitates straightforward access to account transactions, allowing banks to access data from various institutions, thus providing a comprehensive view of customers' financial situations (Hung et al., 2020). In this context, the rise of big data is crucial in evaluating credit risks, as the financial sector now has unprecedented access to extensive data sets. By leveraging complex algorithms for automated analysis of account transactions, banks can identify payment behavior patterns, enhancing the precision of risk assessments (Rosati et al., 2022). The prompt availability of financial data through PSD2 enables efficient algorithmic decision-making processes (Smolinski et al., 2017).

From a banking perspective, algorithm-based decision systems automate and expedite many processes, resulting in reduced personnel costs and increased objectivity in decision-making. Customers can apply for loans anytime and receive approval or denial within minutes (BaFin, 2023). In non-risk-relevant scenarios, a single vote is sufficient for loan approvals, paving the way for fully automated applications if the institution has the necessary technology (Sumper & Merker, 2017). Consequently, loan processing becomes quicker and less bureaucratic, with 81% of cases benefiting from accelerated decisions (van Kerckhoven, 2024).

Predictive models and algorithms enable banks to forecast future cash flows and potential default risks, allowing for proactive risk management rather than reactive responses. For example, research by the Sparkassen-Finanzgruppe revealed significant differences in account data between solvent and insolvent companies, indicating that insolvency often leads to more excellent debit balance increases without corresponding turnover (Fischer, 2001). Automated transaction analysis can thus provide vital insights for creditworthiness assessments and proactive risk management (Grunwald & Grunwald, 2008).

The automation also reduces error rates and simplifies the overall process, minimizing manual interventions and enhancing decision accuracy. Streamlined sub-processes lead to improved production efficiency and higher quality, which can result in up to a 27% increase in customer satisfaction (Ehlerding & Bräutigam, 2015). By analyzing customer and transaction data, banks can create tailored credit products that better meet financial needs and risk profiles, fostering customer loyalty and enhancing service perception (Srivastava & Gopalkrishnan, 2015). The improvements could yield a 10% increase in revenue and up to 30% in cost reductions through enhanced efficiency (Thiesmeyer, 2017).

Risks and Challenges

Despite the numerous opportunities, the digital credit process and automated transaction analysis face several challenges. Security concerns are paramount, particularly regarding the accessibility of data through APIs. Robust customer authentication methods, such as biometrics and one-time passwords, must be implemented to combat the rising cyber-attack threats and identity theft (Geva, 2009; Hung et al., 2020). Additionally, banks must comply with data protection regulations, ensuring transparent customer data handling while adopting data minimization principles (Costina, 2022; Imthurn, 2022).

Technological risks associated with increased connectivity with third-party providers present vulnerabilities, such as inadequate API security, which can lead to potential unauthorized access (Hung et al., 2020). Moreover, operational risks exist if algorithms misclassify credit ratings, resulting in significant financial and reputational damage. Bank management should thus personally review high-risk cases, even when IT departments provide recommendations for automated processing (Sumper & Merker, 2017).

Regulatory challenges also limit digitalization efforts. For instance, German banking laws require the dual control principle for risk-relevant loans, necessitating physical reviews and signatures, which inhibits the complete automation of credit decisions (Sumper & Merker, 2017). Supervisory authorities' skepticism toward technology promotes siloed thinking, complicating end-to-end process approaches.

Furthermore, the effectiveness of predictive models hinges on the quality and balance of training datasets. If training data lacks representativeness, biases may arise, leading to discrimination in credit assessments. Furthermore, the social implications of automated decision-making systems must be acknowledged, as algorithms can perpetuate existing biases. Regulatory bodies advocate for transparency and accountability in algorithmic decision-making (BaFin, 2023; Zweig & Krafft, 2018).

In summary, while automated account data analysis enhances creditworthiness assessments, it should complement existing evaluation instruments rather than replace them (Reuter & von Stein, 1984). The interplay of opportunities and risks underscores the need to implement digital processes in the banking sector carefully.

Strategic Implications and Recommendations

Analyzing the opportunities and risks offers actionable recommendations to address these identified challenges and opportunities. These suggestions are intended to assist bank managers, and decision-makers in formulating robust strategies that foster long-term competitiveness and sustainable growth.

In the digital age, data serves as the foundation for successful business models in banking. Developing a comprehensive data strategy that emphasizes security and transparency is essential to fully harness the potential of Open Banking and automated transaction analysis. This strategy involves systematically collecting, analyzing, and utilizing data to enhance customer benefit and the bank's

internal decision-making processes. By integrating machine learning algorithms and AI into analysis processes, banks can better identify patterns in customer transactions that may indicate credit risks, enabling real-time assessments and early detection of potential issues.

Building a solid data infrastructure allows banks to respond swiftly to market changes, provide customized credit products in real-time, and adhere to regulatory requirements to maintain customer trust.

In addition, modernizing the IT landscape is also recommended to improve credit process efficiency and flexibility. Transitioning to a modular IT architecture that utilizes microservices facilitates the development of real-time, end-to-end credit solutions. An API-based system, compliant with PSD2, can enhance user experiences across all channels while positioning banks for future growth and enabling quicker adaptation to technological advancements.

As part of this modernization, banks must ensure that process changes are customer-centric rather than constrained by existing technical limitations. Efficient, lean processes should be designed to enhance customer benefits. Automating transaction analysis enables banks to create comprehensive and accurate customer profiles, leading to personalized lending and tailored credit products. By leveraging insights from transaction analysis, banks can enrich customer credit profiles beyond traditional scoring methods, improving customer experiences and reducing IT complexity and process costs.

Finally, banks should proactively invest in new technologies and enhance process automation, especially concerning automated transaction analysis. Such investments facilitate efficient management of regulatory requirements through real-time monitoring of customer transactions, allowing for early identification of potential risks and quicker responses to shifts in customer behavior. Automation streamlines processes, significantly reducing personnel costs and errors in back-office operations.

Summary

Lending remains a core function of banks' corporate client businesses, generating significant interest income. However, traditional credit processes are often manual and lengthy, failing to meet growing customer expectations for speed and digitization. Many digital initiatives have focused on small loans, leaving complex credit decisions reliant on outdated methods. IT systems, while crucial, frequently hinder rapid process adaptation.

The regulatory framework, including MaRisk, mandates a clear separation of tasks and responsibilities, particularly in risk-relevant lending, and prescribes standardized risk assessment procedures. While digitizing credit processes could enhance efficiency and customer satisfaction, it would require substantial changes to IT infrastructure and process architecture.

Current creditworthiness assessments rely on qualitative and quantitative factors, with traditional balance sheet analyses demonstrating limitations in early risk detection. Modern rating systems,

though beneficial, require further enhancements. A holistic risk analysis approach is advocated, considering not only individual exposures but also the entire credit portfolio, with IT playing a vital role.

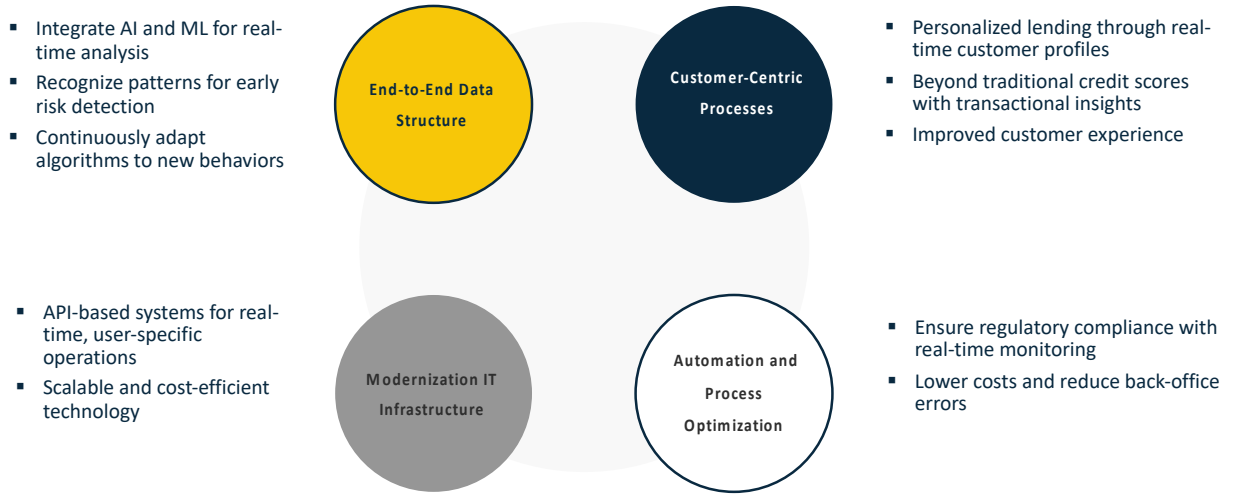

Figure 3 Overview of implications and recommendations

The ongoing digital transformation is reshaping industries, and banking is no exception. Digitalization presents a formidable challenge but offers opportunities through Open Banking, which facilitates secure data exchange between banks and third-party providers. PSD2 has standardized this access, fostering innovation and competition while posing security and regulatory challenges.

Technological innovations, particularly AI, are crucial to optimizing credit processes. Extensive data analysis and pattern recognition enable quicker decisions. While simple lending cases can be fully automated, ethical considerations and transparency remain crucial for building trust.

Banks should implement a comprehensive data strategy prioritizing security and transparency to capitalize on Open Banking and automated transaction analysis. A modular IT architecture grounded in APIs should facilitate efficient, customer-centered credit processes. Early investment in automation technologies will enable better regulatory compliance and risk identification.

The advantages of the digital credit process include improved insights into customers' financial situations, faster and more accurate credit risk assessments, and reduced manual errors, leading to increased efficiency and customer satisfaction. Predictive models can facilitate proactive risk management, and studies indicate that monitoring account behavior provides early warning signals of insolvency.

Despite these benefits, challenges persist. Security and data protection concerns necessitate robust authentication methods, while technological risks, such as insufficiently secured APIs and flawed algorithms, can result in erroneous credit decisions. Regulatory frameworks require ongoing human oversight, particularly in high-risk scenarios, and algorithms may perpetuate discrimination if not continuously monitored.

In conclusion, digitalizing credit processes in business banking holds significant potential to enhance efficiency and quality. A thorough reevaluation and restructuring of the credit process, unencumbered by traditional constraints, is essential for banks to adapt to emerging technological opportunities and improve service delivery.

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