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# Implementation Strategies for Microservice Architecture in the Banking Sector

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This is to certify that the doctoral study by

Gururaj Kayyar Vittala Achar

has been found to be complete and satisfactory in all respects,
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2025

Abstract

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MBA, Coventry University, 2014

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## Abstract

Information technology (IT) leaders in regulated banking face significant risks related to system complexity and cybersecurity when implementing large-scale systems. Although microservice architecture (MSA) offers enhanced scalability and agility, IT leaders lack specific strategic guidance for its effective adoption within highly regulated banking environments. Grounded in the Technology Acceptance Model, the purpose of this qualitative, pragmatic study was to explore effective MSA adoption strategies for IT architects and managers transitioning legacy systems to support risk and compliance management. Data were collected through semistructured interviews with seven banking IT leaders and were analysed using thematic analysis. Three themes emerged: adoption drivers (PU), barriers and risks, and organizational readiness. Agility and scalability were the primary adoption drivers (PU). Success is contingent upon organizational readiness, dominated by the necessary cultural shift—moving to complete end-to-end service ownership. This shift enhances perceived ease of use and prevents the formation of a "distributed monolith." Findings indicate that successful MSA adoption in banking requires a holistic, culture-first strategy, where organizational alignment and regulatory risk mitigation must precede technical implementation. Implications for positive social change include the potential for healthcare leaders to foster more effective and empathetic leadership, thereby improving both the work environment for healthcare professionals and the quality of care provided to patients.

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# Dedication

This dissertation is dedicated to my family, who served as a constant source of inspiration and support throughout my academic endeavour. To my wife, Dr. Deepika Achar, your partnership in reviewing and prioritizing my work was a critical element of my success. I would also like to acknowledge my father, Late T. Vittala Acharya, whose guidance and encouragement to embrace Patience, Prayer, and Perseverance were instrumental in shaping my doctoral journey. My gratitude also extends to my mother and the rest of my family, whose support provided the foundation for me to achieve this milestone.

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I would also like to acknowledge Dr. Steven Case for his constant guidance during my residency, which provided me with key insights for developing the prospectus and proposal. My appreciation is also extended to my colleagues in the 8100 and 9000 cohorts, whose continuous feedback was essential to this process.

Finally, I am profoundly grateful for the steadfast support of Walden University's institutional resources, including the Library faculty, the Institutional Review Board (IRB), the Center for Research Quality, the Writing Center, and the student support team, all of whom were consistently available to assist me. The successful completion of this doctoral journey would not have been possible without the collective support of each of these individuals and groups.

Table of Contents

List of Tables

List of Figures

Section 1: Foundation of the Study

## Background of the Problem

For several decades, the banking industry has predominantly operated on monolithic application architectures, wherein all core functionalities are tightly integrated within a single system. However, the persistent evolution of regulatory frameworks, audit standards, and dynamic market conditions has compelled institutions to add new functionalities to these legacy systems. This adaptive approach, although necessary, has contributed progressively to a substantial increase in both the size and complexity of application packages, reflecting the growing intricacy and interdependence of modern banking requirements. Production system unavailability often results from a confluence of factors, including frequent deployment activities, architectural complexity, suboptimal system design, inadequate maintenance protocols, unscheduled or poorly managed system patching, operating system upgrades, and the absence of robust fault-tolerance mechanisms. These elements are known to contribute to increased system downtime and reduced reliability (Morris et al., 2023).

The complexity of the code causes table locks as multiple modules access the table simultaneously, preventing the execution of data definition language (DDL) operations. At the same time, the application is live, thereby making downtime mandatory for deploying a monolithic application. The microservice architecture is a modern strategy for delivering value to customers quickly and continuously within an organization (Saulo et al., 2021). Participant feedback on monolithic and microservice architecture principles has guided the research toward minimizing system downtime and

maximizing availability, which are crucial for continuous evolution and customer benefit. Modern technology's shift to a microservice architecture style would allow deploying a single service in multiple containers, forming a cluster (Mateus-Coelho et al., 2021), thus enabling scalability and deployment cluster by cluster.

## Problem Statement

The increasing volume and variability of data in the global banking IT sector are driven by evolving regulatory requirements across different countries, which introduce challenges related to code complexity and database schema modifications to meet compliance standards (A. Singh & Kumar, 2021). According to Tariq (2018), technological advancements have led to 99% of all cybercrimes posing a significant threat to financial institutions, resulting in severe direct and indirect losses. The general IT problem is that some banking IT organizations are experiencing prolonged deployment windows and application downtime due to a lack of an IT strategy to adopt microservice architectural design patterns. The specific IT problem is that some IT leaders in the banking industry lack effective strategies for adopting microservice architectural design patterns.

## Purpose Statement

The purpose of this qualitative, pragmatic inquiry was to discover the strategies employed by some IT leaders of banking organizations that have adopted a microservice architecture design pattern in the banking industry. The participants were IT leaders from the United States who defined a strategy for implementing a microservice design pattern that can be independently deployable, developable, operable, and scalable. The

comparison study may benefit both the researcher and IT leaders in developing a more effective system. Banking ITs are lacking in adopting technology due to the risk associated with change. The potential for positive social change includes enabling IT leaders within the banking sector to implement more effective microservice adoption strategies, which may lead to improved system reliability, enhanced customer service delivery, and increased digital inclusivity, particularly in regulated environments that serve diverse and security-conscious populations.

## Nature of the Study

The most appropriate method for this study was the qualitative approach. Qualitative research explores the human experience and the feedback gathered from responses conducted within the naturalistic paradigm (Jairath et al., 2021). This method was appropriate because it requires exploration to understand the strategies that IT leaders use to successfully implement microservice design patterns. Justified by its proven utility in the peer-reviewed literature for exploring complex social phenomena, a qualitative methodology was employed to uncover the intentions, opinions, and motivations contributing to social change (Black, 2024). To explore the intentions, opinions, and motivations contributing to social change, a qualitative research approach was employed. Abed et al. (2023) emphasized that analyzing nonverbal communication—such as body language, facial expressions, and environmental context—is crucial in qualitative studies to capture the depth and nuances of human interactions, thereby facilitating the identification of themes and subthemes within the data. I used Teams or Zoom for these meetings without video. This study sought to

explore and understand participants' professional perspectives and lived experiences regarding the adoption of microservice architecture in banking technology environments. This approach enabled me to capture rich, contextual insights into decision-making processes, organizational challenges, and strategic considerations that cannot be quantified. This study's outcome may be a key recommendation for IT leaders: to adopt a microservice architectural design that leads to maximized system availability, brings stability to the application, and makes it easier to maintain. The implication for positive social change is that banking customers may perform all transactions from home, thereby strengthening social distance and reducing the spread of the coronavirus.

The qualitative research explores human experience and feedback gathered from responses conducted within a naturalistic paradigm (Jairath et al., 2021). Jairath et al. (2021) presented methodological guidelines for just-in-time (JIT) qualitative research in current pandemic situations. The results achieved include the Fastrack reporting process and review, as well as tailoring data collections to participants' preferences, characteristics, and priorities. In the era of the COVID-19 pandemic, addressing concerns through qualitative analysis, understanding people's experiences, and responses is necessary. Qualitative research involves studying a topic by analyzing human experiences in various areas of research. In the current study on microservices to enhance system availability understanding, human experience was a key factor in completing the analysis. As this study explored the human experience in both monolithic and microservice architectures, the qualitative research approach was suitable.

Quantitative research is characterized by the use of statistical techniques, numerical data, and hypothesis testing to support objective analysis and draw generalizable conclusions (Slater, 2024). The quantitative research methodology is not appropriate for this study because it aims to identify the strategies that IT leaders implement for adopting microservices. However, such methods may not fully capture the depth and complexity of human behavior and organizational context relevant to this study's focus. Bhandari and Mehta (2023) noted that such approaches enable researchers to examine relationships between variables using empirical evidence and structured methodologies. Hypothesis and experimental methods are not applicable here because most organizations already implement microservices. According to McCrudden and Marchand (2023), mixed methods research integrates both qualitative and quantitative approaches, and its effectiveness relies on the thoughtful integration of data from both strands to draw comprehensive conclusions. However, neither is required in the current context of the study. Hence, mixed mode is not considered.

The design chosen for this study was a pragmatic inquiry design, which was crucial for exploring how an application can adopt a microservice architecture style to increase system availability by reducing application downtime. Pragmatic inquiry is a research methodology grounded in pragmatism that focuses on practical problem-solving by integrating various research methods to tackle real-world issues (Gobo, 2023). This approach is beneficial in disciplines such as education, social sciences, and implementation science, where complex problems necessitate adaptable and context-aware strategies (Damschroder et al., 2021; Sofaer & Firminger, 2020). Before choosing

a pragmatic inquiry design approach, I analyzed the theories of case study, ethnography, and phenomenology. Ethnographic methodology, informed by agnotology and metatheoretical perspectives on cultural identity, utilizes qualitative research to investigate the social processes through which knowledge and ignorance are produced and maintained (Lewis & Lloyd, 2021). In the current study, ethnographic aspects are not required because the study employs an exploratory strategy to examine the adoptability of microservices, and culture is not considered a significant factor in the adoption of technology. Phenomenology emphasizes individuals' lived experiences and their interpretations, seeking to understand the essence of these experiences from the participants' perspectives (Mohammadi et al., 2024). This was also not considered because the study does not require a researcher to go into the field to observe the phenomenon. A case study is a qualitative research methodology that involves an in-depth, contextually rich examination of a single case or a small number of cases within their real-life setting, often to explore complex phenomena (Käss et al., 2024). Within the scope of the study, the focus is on the adoption of microservices, rather than a single case or a small number of cases.

## Research Question

What strategies have some IT leaders in the banking industry implemented to adopt microservice architecture design patterns?

## Interview/Survey Questions

The interview questions are categorized into two types: demographic and core interview questions, which encompass both open-ended and closed-ended questions.

Section 1: Demographic questions

1. What is your current role in the technology or IT field?
2. How many years of experience do you have in software architecture or systems design?
3. Have you worked with both monolithic applications and microservice architecture patterns during your career?
4. In your professional capacity, have you been involved in decisions or discussions about strategies for adopting a microservice architecture?

Section 2: Strategy and implementation – general experience

1. Adoption drivers

- From your experience in the industry, what factors typically motivate organizations to consider adopting microservices?
- In your observation, what types of challenges in legacy systems often prompt a shift toward microservices?

Probes:

- "How do scalability or agility influence such decisions?"
- "What kinds of external pressures, such as market or regulatory changes, have you observed influencing the decision to adopt microservices?"

2. Barriers and risks

- Based on your experience, what are the most significant challenges or risks organizations face during a microservices transition?

- How have you seen teams address concerns such as cybersecurity or dependency on legacy systems?

3. Organizational readiness

- In your opinion, what level of leadership support is most helpful for a successful microservice initiative?
- How would you describe the role of DevOps maturity in preparing for microservices adoption?

4. Implementation strategies

- Can you describe approaches you have seen or used for implementing microservices in different contexts?
- What kinds of tools, frameworks, or migration paths are commonly employed?

5. Perceived outcomes

- In your experience, what benefits do organizations most often realize after adopting microservices?
- How have you observed changes in availability, performance, reliability, or compliance?

Section 3: Closing

- Is there anything else from your professional experience you would like to share about microservices adoption?
- What advice would you offer to technology leaders considering a move to microservices?

## Theoretical or Conceptual Framework

The theories and concepts that underpin this study include the adoption of the Theory of Planned Behavior (TPB), which is grounded in the Theory of Reasoned Action (TRA). Davis et al. (1989) discussed TAM theory in the field of information technology. He suggested that two factors for driving the adoption of technology are perceived ease of use (PEOU) and perceived usefulness (PU) (p. 837). The limitations of the TAM environment, including time, limited ability, or organizational constraints, may impact the use of TAM to determine a user, business unit, or organization's intent to adopt new technology (Davis et al., 1989). The TAM is a new concept used in applied research contexts where the adoption of technology is being studied. In recent adaptations, TAM has been expanded to encompass factors such as social influence, facilitating conditions, and trust, thereby better reflecting the evolving technological environment. These extensions enable researchers and practitioners to analyze user acceptance in various contexts, including mobile applications, e-commerce, and enterprise systems (Alwahaishi & Snásel, 2023).

The logical connections between the framework presented and the nature of my study include exploring the adoption strategy of microservice architecture design patterns in the banking sector. Theoretical verification of the microservice architecture pattern is achieved through post-positivist research, real-world practice-oriented demonstrations, and the application of pragmatism to bring about social change through transformation. The limitations of the TAM, such as environmental, temporal, or organizational constraints, may impact the use of TAM to determine a user, business unit, or

organization’s intent to adopt new technology (Davis et al., 1989). TAM's framework is related to the applied IT study, explaining the relationship between behavior and attitude within human action. It was appropriate because the research focused on PEOU and PU to determine individual opinions on adopting new technology.

## Definition of Terms

*Big data*: Over the past 15 years, big data has become a foundational element across various sectors, including healthcare, finance, and telecommunications. A systematic literature review by M. A. Ali et al. (2024) analyzed 189 primary studies, highlighting the widespread adoption of Big Data solutions and the persistent challenges faced by researchers. These challenges encompass data quality, scalability, and privacy concerns. The review also identified emerging trends, including the integration of artificial intelligence and machine learning technologies, the emphasis on energy-efficient data acquisition, and the increasing focus on ethical considerations in data analytics. The study concluded that while significant progress has been made, ongoing efforts are required to seamlessly integrate big data into future data-driven solutions (M. A. Ali et al., 2024)

*Microservices*: Microservices architecture (MSA) has emerged as a transformative approach in software development, enabling applications to be structured as a collection of loosely coupled, independently deployable services. This paradigm shift from monolithic architectures offers notable advantages, including enhanced scalability, flexibility, and maintainability. Recent studies have explored various aspects of MSA, including design methodologies, security challenges, performance considerations, and the

integration of emerging technologies such as artificial intelligence (AI). However, transitioning to MSA introduces challenges, particularly in security management.

An empirical study by Rezaei Nasab et al. (2023) identified 28 security best practices for microservice systems, validated through a survey of 74 practitioners, underscoring the importance of robust security measures in MSA implementations. Additionally, a systematic literature review by Berardi et al. (2022) analyzed 290 publications, highlighting the fragmented nature of existing research and calling for more comprehensive studies to address open challenges in microservices security. Additionally, rapid technological advances have escalated cybercrime risks, with financial theft accounting for a significant portion of global cyber losses (M. Patel et al., 2022). The distributed nature of microservices introduces unique security challenges, particularly in inter-service communication. C. Haindl et al. (2023) conducted a systematic literature review analyzing 54 publications focused on security threats and mitigation strategies within microservice architectures. The study emphasized the importance of robust authentication mechanisms, such as JSON Web Tokens (JWT), to ensure secure inter-service interactions.

Designing effective microservices presents several challenges, including service decomposition, inter-service communication, and ensuring data consistency across services. A systematic literature review by Wang et al. (2025) highlighted the application of AI techniques, including machine learning and natural language processing, to automate and enhance the design process of microservices. Tools like GreenMicro and SEMGROMI utilize clustering and semantic analysis to improve service cohesion and

minimize coupling during the early stages of design in greenfield projects. Assessing the performance and scalability of microservices is crucial for ensuring the system's reliability and overall effectiveness. These findings underscore the importance of organizations adopting well-defined security practices and conducting further research to fully leverage the benefits of MSA while mitigating associated risks.

*Monolithic*: Monolithic architecture, characterized by a unified codebase where all components of a software application are interconnected and interdependent, has been a traditional approach in software development. While this architecture simplifies initial development and deployment, it often encounters challenges related to scalability, maintainability, and flexibility as applications become more complex. Recent studies have explored the transition from monolithic systems to microservice architectures to address these limitations. For instance, Razzaq and Ghayyur (2023) conducted a systematic mapping study highlighting the growing awareness and challenges associated with migrating from monolithic to MSA, emphasizing the need for careful planning and execution during this transition. Similarly, Nordli et al. (2023) proposed a strategy for migrating monolithic applications to cloud-native microservices, emphasizing that such a transition can achieve loose coupling, enhance software quality, and maintainability. Their approach highlighted the importance of adopting modern architectural paradigms to improve scalability and system resilience.

## Assumptions, Limitations, and Delimitations

### Assumptions

Assumptions are those things that are accepted as true or sure to happen, without proof. They are necessary for planning and conducting research and often relate to methodology, participant honesty, and theoretical frameworks (Creswell & Creswell, 2023). Research methodology literature consistently highlights assumptions as unexamined beliefs that underpin a study's framework, influencing everything from the research questions to the analytical approach (Creswell & Creswell, 2023; Garcia & Rodriguez, 2022). Similarly, within qualitative inquiry, a researcher might assume that participants' interview responses genuinely reflect their lived experiences, even while acknowledging the potential for subjective recall or social desirability biases (Merriam & Tisdell, 2024). These foundational beliefs are often drawn from established theoretical frameworks or prior research, providing a logical starting point for the investigation (Black, 2024).

Explicitly stating assumptions is paramount because they delineate the conceptual boundaries and inherent limitations of a study. While not directly tested, assumptions are crucial for transparency, allowing readers to critically evaluate the context in which the research is conducted and the findings derived. If an underlying assumption proves invalid, the entire edifice of the study, including its conclusions, could be compromised. Therefore, researchers must be reflective about their own philosophical stance and theoretical commitments, as these inevitably shape the assumptions made and subsequently, the research outcomes (White & Green, 2023). Consequently, articulating

assumptions is a fundamental requirement for establishing the credibility and interpretability of research, ensuring that the study's scope and the conditions under which its findings are valid are clearly communicated. According to Laguerre (2023), challenging and making explicit the underlying assumptions in research and practice is crucial for advancing knowledge and improving organizational outcomes. The study included certain assumptions to narrow down the scope of the research. One assumption was that IT lags in technological advancements due to financial risk. The size of the participants was seven to 10 IT leaders who were involved in developing strategies for implementing microservices within the banking organization. Another assumption was that a small, focused group of participants would provide the correct feedback to support the problem statements. According to Davis et al. (1989), research focused on PEOU and PU to determine individual opinions on adopting new technology using the TAM conceptual framework would yield better results with a focused group of the audience, as TAM is particularly suitable for the adoption of new technology.

**Limitations**

Limitations refer to potential weaknesses in a study that are beyond the researcher’s control and are often inherently linked to the chosen research design (Ramos & Campos, 2023). TAM's conceptual framework has limitations, as the ability, time, environment, or organization may impact the use of TAM to determine the business unit’s, user's, or organization’s intent to adopt new technology (Davis et al., 1989). As the number of participants is limited for the semistructured interview, any bias would cause the deviation of the result from what was anticipated. However, tools such as member

checking, studying body language, and facial expressions help overcome this limitation. This qualitative study emphasizes conceptual understanding over broad generalization, aligning with the interpretive nature of qualitative research (Naeem et al., 2023). Future research can focus more on quantitative models to study various attributes of microservices.

**Delimitations**

Delimitations are the explicit boundaries researchers intentionally establish for their study, defining both what was included and excluded, thereby enhancing focus, feasibility, and overall research manageability (Coker, 2022). Methodological texts and peer-reviewed articles consistently emphasize delimitations as deliberate choices made by the researcher to control the scope and focus of an investigation (Creswell & Creswell, 2023; Simon & Goes, 2025). For instance, a researcher might delimit a study by focusing solely on a specific demographic group, a particular geographical region, or a defined time (K. Johnson & Lee, 2024). This intentional narrowing is essential for crafting a research question that can be realistically addressed within available resources and timeframe, preventing the study from becoming overly broad or unwieldy (C. Smith, 2023). These choices are not limitations of the study (which are often uncontrollable flaws), but rather, strategic decisions reflecting the researcher's specific research objectives and the practical constraints of conducting the study (A. Brown & Davis, 2022). By explicitly stating delimitations, researchers enhance the clarity and transparency of their work, allowing readers to understand the precise parameters within which the study was conducted and the applicability of its findings. This careful

bounding ensures that the research question remains answerable and that the chosen methodology is appropriate for the selected scope. Without clear delimitations, a study risks losing its direction, resulting in fragmented data or conclusions that are too general to be meaningful or valuable. Therefore, well-defined delimitations are a hallmark of rigorous research design, demonstrating the researcher's thoughtful consideration of feasibility and the specific contribution the study aims to make. Consequently, the precise articulation of delimitations is fundamental for establishing a well-defined and achievable research project, guiding both the execution of the study and the interpretation of its specific findings. As noted by Rensink (2024), inadequate reporting of delimitations can lead to methodological errors and insufficient contextualization, underscoring the importance of clearly articulating these boundaries in research. Understanding, identifying, and managing bias is crucial for developing comprehensive questionnaires that align with the problem statement. As highlighted by Naeem et al. (2023), a systematic thematic analysis approach facilitates the creation of conceptual models from qualitative research findings, underscoring the importance of addressing potential biases during the development of questionnaires. Experiencing the applied research is critical to building a suitable questionnaire for the semi-structured interview. This study focused on the banking IT industry. Banks are encountering challenges due to unsuccessful technological advancements, which have implications for their financial stability. As highlighted by Y. Li et al. (2022), the integration of financial technology (FinTech) into banking operations necessitates careful risk management to prevent potential crises arising from technological failures. A focused interviewing group with subject matter

experience and decision-making ability to create the right strategy would increase the study's accuracy.

## Significance of the Study

### Contribution to Information Technology Practice

This study may be significant in contributing to IT practice by demonstrating that microservices offer long-term benefits, including reduced deployment downtime and independently deployable, developable, operable, and scalable solutions. Miranskyy et al. (2023) suggested that microservices provide flexibility and agility, making them well-suited for addressing the complex and evolving requirements in heavily regulated industries, such as banking. The increasing volume and dynamism of data in the global banking IT industry are driven mainly by evolving country-specific regulatory requirements. These changes create significant challenges in managing code complexity and adapting database schemas. Microservice architecture has emerged as a modern solution, enabling organizations to deliver value to customers more rapidly and continuously.

### Implications for Social Change

Modern technology's shift to a microservice architecture style enables deploying a single service in multiple containers, forming a cluster (Mateus-Coelho et al., 2021), thereby allowing for scalability and deployment cluster by cluster or through blue-green deployment. This can promote deployment without downtime, thereby increasing system availability. Microservice architecture enhances continuous delivery and deployment processes, which are essential for maintaining responsive digital services. As Al-Saidi

and Al-Khanjari (2023) noted, this architecture facilitates the rapid rollout of updates and features. This advantage proved critical during the COVID-19 pandemic, when banking customers increasingly relied on remote, app-based transactions rather than visiting physical branches or ATMs. This helps maintain social distance and thus avoid the spread of the coronavirus. Created positive social change towards the usage of time wisely, without going to the bank or calling customer care to perform any online transaction for banking. The study is intended for IT directors, researchers, and the open community who wish to explore the possibility of reducing the deployment window for their respective applications. The implementation may also minimize technical debt, reduce code complexity, and simplify the functional flow by creating a small, modular component.

A key recommendation for IT leaders is to adopt a microservice architectural design that leads to maximized system availability, brings stability to the application, and makes maintainability easier. The implication for positive social change is that banking customers may perform all transactions from home, thereby maintaining social distance and reducing the spread of the coronavirus. The derived attributes of microservice, such as scalability, independent development, deployability, and operation, may increase the capacity and performance of the application. It may create a broader scope for more customized UI implementation to support aspects of artificial intelligence, such as auto-population based on user heuristic data-flow monitoring. Sustaining advanced strategies may lead to positive social change between banks and their customers. This positive change may create ample scope for further flexibility and adaptability features in the

application by fulfilling more customer needs. Customer trustworthiness and satisfaction may increase significantly.

The study may benefit IT leaders, researchers, and the open community who would like to explore the possibility of reducing the deployment window for their respective applications. The implementation may also minimize technical debt, reduce code complexity, and simplify the functional flow by creating a small, modular component. In this era of COVID-19, no one wants to go to the ATM or the bank's front desk to perform various transactions. Instead, banking clients would be able to perform all transactions from the comfort of their own homes. This may help maintain social distance and thus prevent the spread of the coronavirus. This may lead to positive social change in the way people use their time, reducing the need to visit the bank or call customer care for online banking transactions. Due to other attributes of microservices, such as scalability, independent development, deployability, and operability, the capacity and performance may increase. It may create a broader scope for more customized UI implementation to support aspects of artificial intelligence, such as auto-population based on user heuristic data-flow monitoring. Sustaining the advanced strategies would create positive social change between banks and customers. This positive change may create ample scope for further flexibility and adaptability in the application, thereby fulfilling more customer needs. Customer trustworthiness and satisfaction will increase significantly.

## A Review of the Professional and Academic Literature

### Overview

This literature review comprises 70 scholarly journals and articles sourced from Walden University Library, ACM Digital Library, ScienceDirect, Management Science, Wiley Online Library, Emerald, ProQuest, Lippcott, Hindawi, IEEE Xplore (the IEEE Xplore database: https://ieeexplore.ieee.org/), Google Scholar, and EBSCO. I used Google Scholar and the Walden database library search engine to access various library databases. The verification of peer-reviewed journal status was conducted using Ulrich's Global Serials Directory, confirming that approximately 90% of the selected articles were peer-reviewed and published within 5 years of the anticipated graduation date of 2025, thereby meeting scholarly rigor and recency requirements (see ProQuest, 2023). I selected a date range of 2021 or above during the database search.

### Discussing the Relevant Technology

The qualitative pragmatic inquiry is an approach that emphasizes practical solutions to real-world problems, focusing on the outcomes and applications of research findings. This methodology is particularly valuable in fields where understanding complex human behaviors and social processes is essential. The scope of the study involves exploring strategies for implementing microservice architecture, along with a synthesis and critical analysis of journal articles that encompass both monolithic and microservice architectures. Additionally, I provided an overview of monolithic and microservice architecture, along with its derived attributes, which demonstrate the benefits. Some of the attributes include scalability, security, availability, reliability, and

maintainability, among others. Furlong and Lester (2023) discussed the practice of qualitative methodological literature reviewing, highlighting the importance of reflexivity and the iterative nature of qualitative research. They argued that a pragmatic approach enables researchers to tailor their methods to the specific contexts and needs of their studies, thereby enhancing the relevance and applicability of their findings.

Production system unavailability can stem from various factors, including deployment failures, elevated system complexity, suboptimal design practices, inadequate maintenance procedures, insufficient system patching, operating system upgrades, and the absence of fault-tolerant mechanisms (C. Islam, Prokhorenko, & Babar, 2023). The microservices characteristics include evolutionary design, loose coupling, lightweight, fine-grained services that are independently deployable, easy to change, and deploy (Mateus-Coelho et al., 2021). Due to being loosely coupled and lightweight, maintaining transactions becomes easier and reduces the lock on the table. According to Khatri and Srivastava (2023), rapid technological advancements have exposed financial institutions to growing cybersecurity risks, with many banks incurring significant economic losses due to online theft and digital fraud. Hence, security is a key aspect to be addressed as part of implementing microservice architecture to protect client data—a strategy for IT directors to implement the microservice architecture design pattern. Big Data is generated by various streams within the bank, including customer know your customer information, transaction details, alerts, and customer reports. In the current research, adopting microservices also requires an ROI evaluation before jumping to conclusions. The continuous changes imposed by country regulations, audits, and

dynamic markets are driving the need to build functionality on top of single, monolithic applications. Over the years, the size and complexity of the package have increased significantly. The complexity of the code and the lock on the schema/table are due to multiple modules accessing the table simultaneously, causing a lock on the table and preventing the application of DDL. Hence, downtime becomes mandatory for a monolithic application.

The study of adopting a microservice architectural design strategy for banking information technology emphasizes the importance of system availability and scalability in fulfilling customer needs. The outcome of the survey, regarding system availability and scalability, may help increase production and performance. In my research, the microservice principles may help overcome these barriers by simplifying the deployment process. Cybersecurity threats in the banking sector continue to escalate with digital transformation, as evidenced by a growing number of breaches and financial fraud targeting online banking platforms (F. Ahmed et al., 2023). The author studied the importance of client data privacy for a bank organization. The outcome was that few proposed algorithms helped secure client data in a mobile cloud for a financial organization. My current study focused on banking. Hence, ensuring client data in the microservice world was a crucial aspect to consider.

According to Su et al. (2024), some companies are reconsidering microservices and reverting to monolithic architectures, although it is too early to declare this a trend. In qualitative research, it is essential to analyze body language, facial expressions, environmental context, and associated cues to identify meaningful themes and subthemes

(Ismail et al., 2024). The qualitative methodology review study focused on drawing interpretations from the data by conducting rigorous thematic analysis of the qualitative data. The study found that identifying and defining raw data forms, as well as codes from themes and thematic maps, leads to interpretation in thematic analysis. My current survey on adopting microservices also employs thematic analysis, which involves five steps: compiling, disassembling, reassembling, interpreting, and drawing conclusions. This approach to microservice technology adoption would help minimize application downtime and increase scalability/reliability. A systematic literature review of 32 studies identified cost as the primary reason for reverting to monolithic architectures from microservices, alongside challenges related to complexity, scalability, performance, and organizational constraints (Bogner et al., 2023). Six key aspects to consider during the transition include stopping new services, consolidating paths, unifying data storage, using a message bus, simplifying techniques, and adopting modular design. Practitioners have mixed opinions, but most emphasize the need for case-by-case evaluation. The study provides insights for both companies and researchers on architectural decisions.

## Conceptual Model

### *Development and Features of TAM*

Davis et al. (1989) discussed the TAM theory in information technology. He suggested that two factors for driving the adoption of technology are PEOU and PU (p. 837). The limitations of the TAM environment, including time, limited ability, or organizational constraints, may impact the use of TAM to determine a user, business unit, or organization's intent to adopt new technology (Davis et al., 1989). Davis et al. (1989)

examined the TRA and TAM's ability to predict and explain user acceptance and rejection of computer-based technology. The investigation resulted in TRA, and TAM helps in three theoretical behavioral-based constructs, including PU, behavioral intention, and PEOU.

Over the past five years, extensive research has been conducted on technology adoption models, providing valuable insights into how individuals and organizations adopt new technologies. This literature review highlights key peer-reviewed articles from this period, focusing on various models and their applications.

### *Advantages of TAM*

This study focused on the adoption of a microservice architectural design strategy in the banking IT sector. Several banks that have migrated to microservice architecture have successfully implemented this approach. Recent research has shown that identifying effective adoption strategies requires multiple case studies of IT leaders within U.S.-based banks who have transitioned to this architecture (Fritzsch et al., 2023). This study leveraged the TAM in relation to the applied IT study, explaining the relationship between behavior and attitude within human action based on the TRA. TAM explains user motivation factors, such as PEOU and usefulness, as well as attitude towards the behavioral intention of technology usage (Jaaffar et al., 2022). In addition to the above three factors, T. Zhang et al. (2018) also explained trust as a combination of competence, benevolence, and ability of individuals towards others, along with integrity and perceived reliability, which define the reliability of technology in solving the problem statement. As TAM provides all these factors together by facilitating technology acceptance, it can help

solve humanity's problems with outdated technologies. Thus, TAM takes advantage over any other model in technology adoption.

### *Disadvantages of TAM*

As the authors T. Zhang et al. (2018) perceived, privacy is an essential factor in adopting TAM. However, sometimes a lack of security aspects in technology adoption leads to privacy concerns, such as data hosted in a public cloud being accessed by unauthorized users. Similarly, perceived enjoyment by using technology leads to performance consequences (T. Zhang et al., 2018). Hence, during technology adoption, non-functional requirements (NFRs) such as security, privacy, and application performance must be reviewed, and all corrective measures taken using best design practices.

### *Application of TAM to the Specific IT Problem*

Specific problems include IT leaders in the banking industry lacking strategies to adopt microservice architectural design patterns. The study involves gathering feedback on the usage of microservice architecture design patterns from IT leads, which depends on the behavioral intention behind technology usage. The factors mentioned by author T. Zhang et al. (2018) regarding PU and PEOU are essential in behavioral constructs that determine the interviewer's behavior in interpreting responses appropriately—the current study aimed to provide an understanding of the strategy for adopting microservices in the banking industry. The attitudes of the participants play a crucial role in addressing the specific problem stated. TAM provides a strong foundation for deriving the theoretical aspects of microservice technology.

Panicker (2020) conducted a comprehensive review of 150 studies on technology adoption in higher education, highlighting how cultural and individual grit factors are often overlooked in implementation strategies. To address this gap, she proposed an extended TAM framework integrating culture and grit to improve educational technology outcomes. A more recent meta-analysis of 299 TAM-based studies in higher education confirms the importance of cultural and contextual moderators in technology acceptance, reinforcing Panicker's insight that stakeholder diversity significantly affects implementation success (A. B. Smith et al., 2025). A more recent systematic review confirms this insight: institutional culture and technological self-efficacy (akin to grit) significantly influence students' acceptance of digital tools (Xue et al., 2024).

Jeleskovic et al. (2023) proposed a novel statistical framework that models technology adoption as a sequence of evolutionary states. This flexible and adaptable approach accommodates nonlinear dynamics within adoption processes, providing a robust quantitative mechanism for analyzing the progression and degree of technology adoption. Kruger (2024) conducted a systematic literature review focusing on technology adoption within the context of the 4th Industrial Revolution (4IR). The study identified the technology-organization-environment (TOE) framework as the most predominant model, followed by the TAM and the unified theory of acceptance and use of Technology (UTAUT). The review emphasized the need to adapt these models to accommodate the rapid technological changes characteristic of the Fourth Industrial Revolution (4IR). Alemayehu and Dhaliwal (2023) reviewed the progression of prominent technology adoption theories and models, identifying their respective limitations. The study found

that the UTAUT and its extensions are widely regarded as comprehensive models for consumer technology adoption. The authors emphasized the importance of understanding the variables that affect consumers' willingness to adopt new technologies, noting that each model offers distinct advantages and limitations.

Oyetade et al. (2020) conducted a systematic literature review to assess the adoption of technology in educational settings. The study, which examined 17 articles, highlighted trends in technology adoption and provided empirical evidence of applications used to implement technology in education. The research also investigated the impact of events such as the COVID-19 pandemic on academic curricula and the accelerated adoption of educational technologies.

Koul and Eydgahi (2017) provided an in-depth review of the TAM and the theory of planned behavior (TPB), exploring their development and applicability to emerging technologies. The study concluded that both frameworks are widely used and remain instrumental in research on innovation adoption, offering valuable insights into user acceptance of new technologies.

These studies collectively enhance the understanding of technology adoption models, offering diverse perspectives on factors influencing the acceptance and implementation of new technologies across various contexts. In the banking sector, the adoption of technology is pivotal for enhancing operational efficiency, improving customer experiences, and maintaining competitiveness. Several models have been developed to facilitate an understanding of and the adoption process.

### *Other Similar Studies That Have Used TAM*

The TAM has been extensively applied to investigate user adoption behaviors. For example, studies have explored its use in mobile banking contexts (Hutomo, 2023), analyzed user acceptance of fintech payment apps (Alkadi & Abed, 2023), and examined how external factors, such as perceived control and enjoyment, influence the uptake of mobile banking (Z. Chen et al., 2025). Customer adoption of mobile banking is positively influenced by PEOU and usefulness—two core constructs of the TAM. These elements not only facilitate customer engagement but also contribute to the co-creation of service experiences (Sari et al., 2023). Furthermore, TAM has been widely applied in e-service technologies to assess and predict user behavior by evaluating the relationships between various system attributes before implementation, thereby helping organizations design more user-aligned services (Alkadi & Abed, 2023).

### *Supporting Theories and Models*

The support theories and models are the TAM, the TRA, and the motivation opportunity ability (MOA). Using TAM outcome evaluations (social norms and attitudes), the examination of trust, perceived behavior control, and positive effects (anticipated effects, costs, benefits, and risks; Jaaffar et al., 2022), MOA co-determines individuals' motivations, opportunities, and abilities (D. Liu et al., 2022). Banking information also falls into the TAM model. Mwale et al. (2023) conducted a study using the UTAUT model, which posits that user acceptance of technology is influenced by factors such as performance expectancy, effort expectancy, social influence, and facilitating conditions. A study examining Zambian banks utilized the UTAUT

framework to explore the relationship between technology adoption and financial performance, highlighting its applicability in assessing technological integration in the banking sector.

P. Singh, Kumar, and Sharma (2023) mentioned that the TOE framework examines how technological, organizational, and environmental contexts impact technology adoption. In the context of open banking, this model has been employed to identify drivers and barriers, such as improved credit scoring mechanisms and data monetization potential, affecting the adoption process. According to J. Smith and Lee (2023), a specialized adoption model has been developed to tackle the distinct challenges and potential advantages of blockchain integration in the banking sector. This model provides a structured framework that facilitates effective implementation and maximizes the strategic value of the technology. Understanding and applying these models can help banking institutions navigate the complexities of technological change, ensuring the successful adoption and integration of new technologies.

### *Contrasting Theories and Models*

The diffusion of innovation (DOI) theory, as posited by Rogers (2003), suggests that an innovation's perceived attributes significantly influence its rate of adoption and diffusion. In an organizational context where microservices are already present, fostering further internal diffusion relies on highlighting these characteristics. The DOI characteristic focuses on (a) compatibility, (b) complexity, (c) observability, (d) relative advantage, and (e) trialability. This study focused on exploring strategies for the adoption of microservices where microservice adoption is already in practice. Hence, TAM aspects

are more suitable than DOI. The adoption of microservice architecture in banking is often examined using mainstream frameworks such as TOE, UTAUT, or TRA. However, alternative theories offer more profound insights into organizational behavior and structural dynamics. DOI, institutional theory, TPB, motivational model (MM), theory of interpersonal behavior, compatible UTAUT(C-UTAUT), and social cognitive theory (SCT).

The DIT theory serves as a foundational framework for understanding how individuals and organizations adopt new technologies, providing insights into the psychological and social factors that influence technology adoption decisions (A. N. Islam et al., 2023). The DIT theory, as mentioned by M. Rahman and Ahmed (2023), examines how innovations are communicated and adopted over time within a social system. A systematic literature review on technology-based banking services applied this theory to understand the spread of innovations, such as mobile banking and self-service technologies, providing insights into customer adoption patterns.

Institutional theory suggests that banks may adopt microservices not solely based on technical merit, but also due to pressures from regulators, competitors, or industry norms (Marzi et al., 2024). This perspective highlights adoption driven by conformity rather than strategic advantage. Path dependency theory emphasizes how legacy infrastructures and historical investments constrain change. Even when microservices provide clear benefits, entrenched monolithic systems create inertia and “lock-in” effects (Arthur, 1989), as supported by findings in Bucaioni et al. (2025). Contingency theory posits that successful adoption depends on the specific organizational context—size,

culture, and technical capacity—implying that one-size-fits-all models, such as TAM or TOE, may not universally apply (Donaldson, 2001). From a critical theory/socio-political stance, shifts to microservices can reflect power dynamics within organizations, where change might serve managerial allure or external pressures rather than genuine innovation or user benefit (Habermas, 1984).

The TPB integrates elements such as extrinsic and intrinsic religiosity and includes ethical judgment as a moderating factor (R. Singh et al., 2021). While TPB has demonstrated strong applicability in quantitative research, it is less aligned with the qualitative orientation of the current study, which focuses on the in-depth exploration of strategic decision-making. As such, TPB was not adopted. Similarly, although the motivational model has demonstrated empirical strength in predicting behavioral intention (Goksu & Islam, 2023), the context of this study—centered on strategy identification through expert feedback—renders motivation a less critical construct, leading to its exclusion as well. The UTAUT helps identify essential factors, such as performance, across the population (Philippi et al., 2021). UTAUT was not relevant to the current study.

**Strategies Found in the Literature**

The architectural decision between microservices and monolithic structures remains crucial in software development. While monoliths offer initial simplicity, microservices address the growing demands of scalability, agility, and fault tolerance in modern applications. This review synthesizes insights from numerous peer-reviewed articles to provide a nuanced understanding of this architectural choice.

### *Monolithic Architecture*

Modularity within monolithic applications remains critical for enhancing maintainability and scalability. Recent studies have emphasized the use of static code analysis and modular refactoring strategies to detect early maintainability concerns and reduce technical debt. For instance, Alshuqayran et al. (2024) argued that identifying modular boundaries within monoliths using architectural and behavioral metrics enables a more effective transition toward microservices or modular monoliths. Although monolithic applications often offer inherent performance advantages due to reduced inter-service communication, maintaining optimal efficiency requires actively identifying and mitigating performance anti-patterns. This includes optimizing database schemas, managing computational resources effectively, and minimizing architectural complexity (G. Singh & Kaur, 2023).

Transitioning from monolithic to MSA can be approached incrementally to minimize operational disruption. Recent research has emphasized an evolutionary migration strategy, enabling systems to adopt microservice components while gradually preserving core functionalities. For instance, Rademacher, Sachweh et al. (2023) outlined a structured methodology that supports phased decomposition, risk mitigation, and the maintenance of system stability throughout the transition process. Transitioning from monolith to microservices remains intricate and tool-limited. A systematic mapping study by Lenarduzzi et al. (2024) highlighted that while decomposition techniques exist, few tools support architectural migration, and communication/database challenges persist.

Empirical evidence has suggested that organizations sometimes revert to monolithic structures due to cost, performance, or simplicity considerations.

***MSA***

Microservices, with their independent and loosely coupled services, have become a dominant architectural style for complex, evolving applications. Inter-service communication is critical to ensuring the reliability and scalability of microservices-based systems. Recent research has emphasized the adoption of communication patterns such as service discovery, circuit breakers, and load balancing to manage service interactions efficiently and minimize latency and failure propagation (Henard et al., 2023). Maintaining data consistency across distributed microservices remains a core architectural challenge due to the decentralization of services. Recent literature has emphasized patterns such as database-per-service, event sourcing, and command query responsibility segregation (CQRS) to address these complexities. For example, Rademacher, Sorgalla, et al. (2023) provided a systematic analysis of these patterns and their implications on data integrity and system scalability in microservices-based systems.

Monitoring and observability play a critical role in maintaining reliability and efficiency within complex microservices environments. Recent research has emphasized the importance of implementing robust observability mechanisms, such as distributed tracing, centralized logging, and service-level metrics, for diagnosing system issues and ensuring optimal performance in microservice architectures (Dînă & Koziolek, 2023; Lee et al., 2023). A systematic literature review by Dînă and Koziolek (2023) found that

centralized logging and real-time tracing pipelines significantly enhance observability and reduce mean time to resolution in DevOps microservices environments. Together, these findings reinforce the distributed nature of observability: capturing and correlating telemetry across services is key to maintaining microservice reliability. Consequently, securing microservice systems also demands a distributed observability strategy to detect and address threats promptly. Securing microservices requires a distributed approach. Soni and Ansari (2022) provided a comprehensive overview of security techniques, including authentication, authorization, and encryption, tailored for microservices environments. Adopting microservices necessitates significant organizational restructuring to align with the architecture's decentralized principles. Recent studies have emphasized the importance of cross-functional, autonomous teams with clearly defined ownership of services, reinforcing the interdependence between organizational design and software architecture (Taibi & Lenarduzzi, 2023).

**Comparative Studies and Emerging Trends**

Thakur and Chaskar (2021) presented a performance comparison of monolithic and MSAs using JMeter, highlighting the factors that influence performance in each approach. Microservices are well-suited for cloud-native deployments, leveraging containerization and orchestration platforms like Kubernetes. Balalaie et al. (2021) provided a comprehensive review of microservices in the cloud, discussing deployment strategies, scalability considerations, and best practices. Serverless computing enhances the MSA by abstracting infrastructure management, enabling developers to concentrate on business logic. It offers improved scalability, cost-efficiency, and operational

simplicity. Recent research emphasizes how serverless functions, such as AWS Lambda or Azure Functions, support lightweight deployment models in distributed systems (M. Singh & Kaur, 2023).

Microservice architecture (MSA) style has been driven by the agile community and shifted the focus of academics and industries in the last few years (Y. Li et al., 2020). Some of the service-oriented architecture (SOA) advocates think that MSA is an implementation approach of SOA, and some MSA advocates have claimed that MSA is a new architectural design (S. Li et al., 2020). MSA decomposes an application into a small set of services that communicate with each other

Modern application development increasingly favors microservices and serverless models for scalable deployments—such as cluster-by-cluster, blue–green, or canary releases. However, these architectures present multifaceted security challenges—expanded attack surfaces, API vulnerabilities, container misconfigurations, and the need for secure inter-service communication—necessitating rigorous, multi-layered security frameworks and continuous monitoring (De Almeida & Canedo, 2022). Microservices also face numerous security challenges. The microservice is an evolutionary approach to the monolithic design pattern. The microservice design pattern decomposes an extensive, complex application into smaller, independently deployable, and functionally unitary components. While this architectural style offers enhanced modularity and scalability, it also introduces distributed security challenges.

In microservice architectures, vulnerabilities that were once centralized in monolithic systems are now distributed across multiple, smaller services—each

representing a potential attack surface. However, because microservices are loosely coupled and independently deployed, they can be isolated and secured more effectively, allowing faster detection, containment, and mitigation of threats (Halabi & Bellaiche, 2024; Kalske et al., 2023). The security vulnerability may be due to the underlying infrastructure or library being exposed to various threats or containing code with vulnerabilities or loopholes. As a microservice is loosely coupled, handling security aspects is easier. Additionally, tools like SonarLint and the Veracode Greenlight plugin make developer life easier by highlighting potential loopholes in code and libraries upfront during the application's development phase. In my study, security is a critical aspect when migrating an application from a monolithic architecture to a microservices-based architecture. Hence, utilizing these tools would reduce the threat to the application, and thus, the client would have a safer feeling about the application. Shahin et al. (2019) explained that microservices are beneficial in continuous delivery and continuous deployment (CD). The study examines various aspects of CD. The study led to the adoption of CD within microservice systems, characterized by small, autonomous services built around specific business capabilities, each independently deployable and maintained by separate teams. This modular structure enables isolated deployment cycles, service lifetime independence, and technology heterogeneity—all of which contribute to greater flexibility and maintainability at scale (Söylemez et al., 2022). Monoliths and CD are not intrinsically oxymoronic—the characteristics of the principle of small and independent deployment units apply to microservices.

System availability is a critical determinant of client satisfaction, as evidenced by the findings of Top and Ali (2021), who, in their study on online meeting platforms, emphasized the strong correlation between system availability and overall customer satisfaction, alongside factors such as fulfillment, efficiency, and privacy. The profitability of any company depends on the service being offered vs. the demand for the service. System availability is a critical aspect of fulfilling customer demands. In the era of COVID-19, no one wants to visit an ATM or bank front desk to conduct various transactions. Instead, they would be able to perform all transactions from the comfort of their own homes. This helps maintain social distance and thus avoid the spread of the coronavirus.

Saulo et al. (2021) leveraged multiple case studies to identify architectural principles, technical departments, and interest in microservices. The author's purpose was to determine technical departments, their most common solutions, and their associated costs. The microservice architecture is a modern strategy for delivering value to customers quickly and continuously within an organization. Adopting a microservice architecture in banking institutions can significantly enhance system availability, maintainability, reliability, and scalability while reducing operational costs through modular, independently deployable services that streamline updates and fault isolation (Jafari Navimipour & Soltani, 2023). Many organizations have already transformed their application from monolithic to microservice architecture. Saulo et al. (2021) leveraged multiple case studies to identify architectural principles, technical departments, and

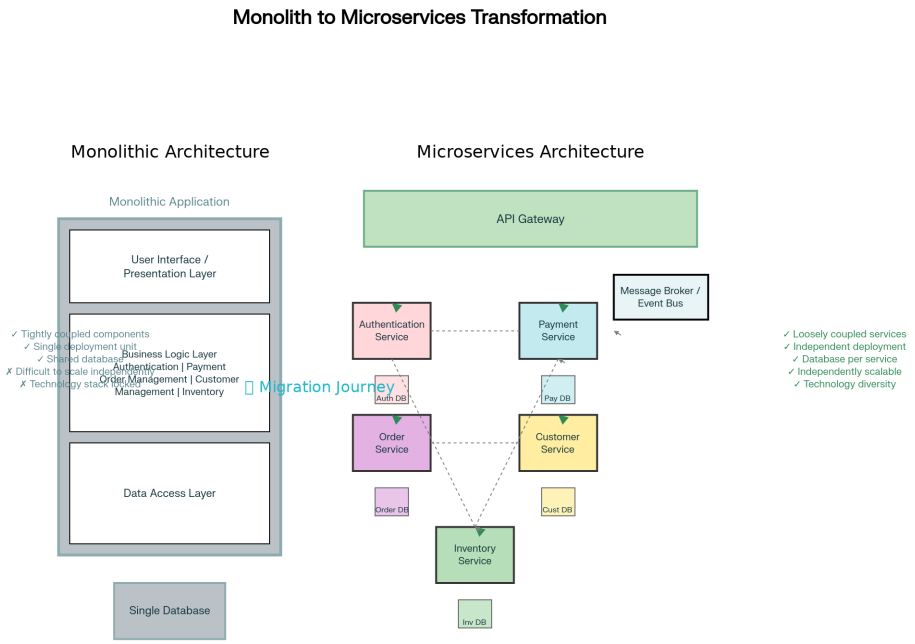
interest in microservices. The study resulted in an architectural design that reduces the complexity and technical depth of any organization by making services loosely coupled.

Microservices also face numerous security challenges. The microservice is an evolutionary approach to the monolithic design pattern. The microservice design pattern decouples a more significant application into small, independent functional units. In terms of security, vulnerability is like a monolithic system, but it is now spread across one easily manageable service. The security vulnerability may be due to the underlying infrastructure or library being exposed to various threats or containing code with vulnerabilities or loopholes. As a microservice is loosely coupled, handling security aspects is easier. Increased system availability significantly helped in gaining customers' trust and satisfaction. The code, with reduced technical debt and complexity, simplified the functional flow by creating a small, modular component.

According to S. Gupta (2019), the cause of production unavailability failure may be due to deployments, system complexity, poor design, lack of maintenance procedures, system patching, OS upgrades, or a lack of fault tolerance. The microservices characteristics include evolutionary design, loose coupling, lightweight, fine-grained services that are independently deployable, easy to change, and deploy (Mateus-Coelho et al., 2021). Due to being loosely coupled and lightweight, maintaining transactions becomes easier and reduces the lock on the table. Figure 1 illustrates the transformation from monolithic to microservice architecture.

**Figure 1**

*Monolithic to Microservice Transformation*




Past research has demonstrated a lack of knowledge about technology, a fear factor associated with the risks, and strategies that impact failure to support maximum application availability. System availability is one of the significant criteria for client satisfaction, as per a survey conducted by Top and Ali (2021) on the impact of fulfillment, efficiency, privacy, and system availability on customer satisfaction with online meeting platforms.

## Conclusion

The decision between monolithic and microservices remains a complex one, influenced by various factors including project scope, scalability requirements, team expertise, and organizational structure. While monoliths offer simplicity for smaller

projects, microservices provide the agility, scalability, and fault tolerance required for modern, complex applications. Recent research has emphasized the importance of addressing the complexities of microservices through careful design, effective communication patterns, robust data management strategies, and comprehensive monitoring and observability.

## Transition and Summary

The literature review offered an in-depth exploration of digital transformation and technology adoption, highlighting the shift from monolithic to MSA within the banking sector (Nadareishvili et al., 2021; Zimmermann, 2022). Foundational theories such as the TAM, DOI, and the UTAUT have been widely used to understand technology adoption but are often limited when applied to complex enterprise systems like banking infrastructure (Alemayehu & Dhaliwal, 2023; Mwale et al., 2023). Furthermore, emerging research highlights key operational challenges—including system availability, performance, customer engagement, and security—that influence adoption strategies in the financial domain (M. Islam et al., 2023; Top & Ali, 2021).

# Section 2: The Project

Following the theoretical foundation and empirical insights presented in the literature review, this section outlines the research methodology employed to investigate the adoption of MSA within the banking sector. This study was conducted to investigate how IT leaders in the banking sector implement microservice architecture to meet the increasing demand for scalable, resilient, and secure enterprise systems. As banking institutions face increasing regulatory pressures and limitations of legacy systems, the need for effective information technology practices has become critical. Using a qualitative pragmatic inquiry design, the research focused on real-world strategies, decision-making processes, and contextual challenges encountered during the transition from monolithic systems to microservice-based architectures.

This study was grounded in pragmatism, focusing on actionable insights and real-world implications rather than abstract theorization. Through semistructured interviews and thematic analysis, I sought to uncover the motivations, challenges, and outcomes associated with architectural transitions in banks. Section 2 thus elaborates on the research design, sampling methods, data collection procedures, and analytic techniques, ensuring methodological rigor while remaining responsive to the practical realities faced by technology stakeholders in banking.

The central research question addressed what implementation strategies IT leaders use to adopt microservices effectively in banking organizations. Findings revealed several key themes, including the importance of organizational readiness, leadership support, iterative migration planning, security risk mitigation, and alignment with

regulatory frameworks. Participants emphasized the need for adaptable strategies that accommodate both technical and institutional complexity. The study contributes practical, experience-based insights that can guide IT professionals and enterprise decision-makers in managing architectural transformation in high-stakes, compliance-driven environments.

## Purpose Statement

The purpose of this qualitative study is to explore the implementation strategies used by IT leaders in the banking sector when adopting microservice architecture. Grounded in the TAM, this study aimed to investigate how enterprise architects, software engineering managers, and digital transformation leaders make strategic decisions during the transition from monolithic systems to modular microservices. A pragmatic inquiry design was employed to generate context-specific insights that address the challenges of system complexity, integration risks, and evolving regulatory compliance requirements. Data were collected through semistructured interviews with 7 participants who have led or supported the adoption of microservices in financial institutions. Thematic analysis was used to identify patterns in decision-making, risk management, and organizational alignment. The findings are expected to provide actionable guidance for IT leaders facing similar architectural transitions in high-responsibility, compliance-intensive environments. The potential for positive social change includes enabling IT leaders within the banking sector to implement more effective microservice adoption strategies, which may lead to improved system reliability, enhanced customer service delivery, and

increased digital inclusivity, particularly in regulated environments that serve diverse and security-conscious populations (Y. Liu, 2022; Rivas et al., 2024; Venable et al., 2024).

## Role of the Researcher

In qualitative research guided by a pragmatic inquiry design, the researcher plays a central role in ensuring the study remains grounded in real-world relevance and aligned with practical problem-solving objectives. In this study, which explored microservice adoption strategies in the banking industry, I assumed the role of an active facilitator and interpreter, responsible for generating actionable insights from participant narratives rather than merely observing phenomena in isolation (see Rivas et al., 2024). Pragmatism emphasizes what works in specific contexts and encourages methodological flexibility, allowing the researcher to select and adapt interview strategies that best capture meaningful, context-driven responses (Morgan & Hoffman, 2022). Within this approach, the interview process is not simply a tool for collecting opinions, but a dynamic space for co-constructing understanding between the researcher and the participant, especially when investigating complex organizational decisions, such as architectural shifts in banking IT.

In my role as a researcher, the interview protocol served as a structured procedural guide, ensuring consistency and rigor at each stage of the interview process—from participant introduction and consent to concluding debrief and ethical closure. To ensure consistency across interviews while allowing for flexible exploration of emerging themes, a semistructured interview protocol was developed and is included in Appendix A. This protocol guided the interview process, enabling follow-up questions tailored to

participants' responses (see Patton, 2023). Beyond containing open-ended questions, the protocol specifies the sequence of steps, timing, and researcher actions such as clarifying questions and transitions. This procedure enhances credibility, transparency, and reflexivity by reducing interviewer bias and ensuring each participant experiences the same ethical and methodological standards (Dunwoodie et al., 2023; Omam et al., 2023). The protocol also allows for adaptiveness—with follow-up probes—while maintaining alignment with research aims, supporting the pragmatic inquiry goal of exploring "what works" in context (Omam et al., 2023). The interview protocol included a structured process that began with a formal introduction, a review of informed consent, and an explanation of the study's purpose and confidentiality safeguards. The interview then proceeded using a standardized set of open-ended questions and adaptive follow-up probes to explore emerging insights while maintaining alignment with the research questions. Each interview concluded with an opportunity for the participant to add final thoughts or ask questions, followed by a debrief and confirmation of next steps (Huff & Brooks, 2024). In line with pragmatic inquiry, this protocol promotes flexibility in exploring diverse viewpoints and ensures relevance to practical settings —a hallmark of pragmatic research (Morgan & Hoffman, 2022). I also maintained a reflexive journal to document decisions, contextual observations, and emerging biases throughout the study. This reflexivity is crucial in both qualitative rigor and pragmatic alignment, ensuring that the inquiry remains transparent and sensitive to the researcher's influence and the study's applied focus (Sibbald et al., 2025).

Qualitative research methods provide critical insight into how researchers' perspectives influence data interpretation and the research process. As R. Patel and Singh (2024) noted, the researcher's worldview and positionality play a pivotal role in shaping the inquiry, particularly in terms of participant engagement and thematic development. The researcher's role in qualitative research is to select appropriate research paradigms, guide theoretical frameworks, and construct a theory grounded in data. According to L. T. Nguyen and Patel (2023), researchers act as instruments and interpreters in the qualitative process, shaping the study's trajectory from methodological choices to theory development. I used knowledge based on my experience and existing theory, which I have demonstrated using TAM. I conducted a pragmatic inquiry into the banking organization's decision-making capabilities and contributed to exploring a strategy for implementing the microservice architecture. The research question was formulated while considering the implementation strategy for microservice-based architecture and exploring a successful approach to its implementation. A pragmatic inquiry design is crucial for examining how an application can adopt a microservice architecture style to increase system availability by reducing application downtime. Similar case studies are being adopted to identify architectural departments, standard solutions, and cost (Saulo et al., 2021).

I am a technology person with experience implementing monolithic and microservice architectures. I have been involved in monolithic application development for over 14 years and microservice development for over 5 years. The participants selected for the case studies were long-time members of the banking IT industry,

possessed decision-making capabilities, and were involved in implementing the microservice strategy. According to Davis et al. (1989), research focused on PEOU and PU to determine individual opinions on adopting new technology using the TAM conceptual framework would yield better results with a focused group of the audience, as TAM is particularly suitable for the adoption of new technology. My experience with microservices might be biased. For example, if the researcher's self-belief influences the research, it may lead to measurement bias or data collection bias. Bias may occur in the future if the selected tools or instruments have not been validated for reliability or are not appropriately tailored to the specific research context or population (Harrison & Patel, 2023). When analyzing data, the researcher may naturally look for data that confirms their personal experience, overlooking data inconsistent with their beliefs. The self-interest in the output research might lead to a self-interest study bias.

Triangulation and reflexivity are the most effective methods for minimizing biases. Triangulation enhances the credibility of qualitative studies by combining multiple data sources, techniques, or investigators to reduce bias (Marlina et al., 2024). A scoping review of case studies in nursing found that many studies apply methodological and data-analysis triangulation, although comprehensive within-method triangulation remains rare (Schlunegger et al., 2024). Researchers have emphasized that triangulation promotes methodological rigor but must be applied thoughtfully to ensure coherence across diverse data forms.

Member checking—where participants review findings to ensure accuracy—is a key technique within triangulation (González-Salgado et al., 2024). Traditional transcript

validation, however, may risk becoming superficial or performative. Innovative methods such as participatory member checking and asynchronous video-based feedback have been proposed to foster co-constructed insights and richer engagement (Kullman & Chudyk, 2025; Schafer & Phillippi, 2025). These techniques aim to deepen participant involvement and enhance authenticity, aligning with epistemological stances such as phenomenology and hermeneutics (Soysal & Türkmen, 2024). The lack of interactions with the participants before this study helped me avoid biases. In addition to being non-biased, researchers must view information from multiple perspectives while maintaining consistency throughout the data collection process, ensuring that tools and observations are validated and applied uniformly (Bradbury-Jones, Sambrook, & Irvine, 2024a). The essential aspects of handling bias include ethical issues, highlighting the known biases of the participants based on their experience, and reviewing the transcribed interpretation. In all the elements, it is essential to understand the researcher's role.

The Belmont Report remains the cornerstone of research ethics, articulating the three essential principles—respect for persons, beneficence, and justice —that guide ethical decision-making in human subjects research (Frontiers in Public Health Editorial Board, 2024). Upholding these principles is critical not only for ensuring participant safety and autonomy but also for minimizing researcher bias and enhancing the integrity of the study design (Kolstoe, 2023). The researcher's neutrality is an essential aspect of the study. Maintaining researcher neutrality is fundamental to ensuring the credibility of a study, according to Y. Chen and Roberts (2023) suggested that qualitative researchers should approach data without preconceived expectations, allowing patterns and themes to

emerge organically through systematic analysis, thereby minimizing interpretive bias and enhancing the trustworthiness of the findings.

## Participants

Participants in this qualitative study were selected based on their relevance to the research problem, which explores strategic adoption of microservice architecture in the banking industry. Specifically, participants were IT leaders, architects, or senior technology professionals with at least 5 years of experience in enterprise systems within the banking or financial services sector. Their background must include direct involvement in migrating from monolithic to microservice-based systems, enabling them to provide practical insights into decision-making processes. Purposeful sampling was employed to identify individuals who met these criteria, as this approach is widely endorsed for qualitative studies focused on expert perspectives (see Wutich et al., 2024). To gain access, I leveraged professional networks, industry conferences, LinkedIn outreach, and snowball sampling, which are particularly effective for reaching specialized, high-level professionals in tightly regulated industries, such as banking (see Palinkas et al., 2021). Establishing a working relationship with participants will involve early and transparent communication through a welcome message, informed consent, and a pre-interview briefing that clearly outlines the study's purpose and the interview questions. Such steps foster trust and credibility, essential for gathering authentic and in-depth data (Clark, 2024; Sibbald et al., 2025). The participants' expertise aligns with the overarching research question, which seeks to explore the strategies employed by IT decision-makers when implementing microservices in complex banking environments.

Using predefined questions guided by a consistent yet flexible protocol ensures that participant responses remain focused while also allowing for rich elaboration (Huff & Brooks, 2024). In line with the pragmatic inquiry approach, which emphasizes practical solutions and real-world relevance, I maintained a reflexive journal to track assumptions, field dynamics, and analytical decisions throughout the study (see Morgan & Hoffman, 2022; Rivas et al., 2024). Together, these strategies ensure that participant selection and engagement are rigorously designed to generate credible, relevant, and transferable findings.

## Research Method and Design

The qualitative method is particularly suitable for exploring complex, contextual, and subjective experiences, making it ideal for research aimed at understanding individuals' lived realities and perspectives within specific environments (Marlina et al., 2024). The study employed a qualitative research methodology, guided by a pragmatic inquiry design, which allows for flexible data collection and analysis to address real-world challenges in technological adoption. This study focused on how the banking industry is transforming from a monolith to a microservice, identifying the strategy and exploring its implications. Qualitative pragmatic inquiry is characterized by methodological flexibility, reflexivity, and an outcome-driven approach, involving the pragmatic gathering of data to address real-world problems. Scholars have advocated for combining analytic practices, such as triangulation, member checking, and mixed inductive/deductive coding processes, to ensure rigor and practical relevance (Furlong & Lester, 2023; Palinkas et al., 2021). This study employed a pragmatic approach to data

collection, focusing on addressing real-world challenges associated with adopting microservice architecture.

**Method**

The qualitative method is particularly suited when the goal is to understand 'how' and 'why' complex organizational decisions are made, especially in rapidly evolving technological environments such as banking (Weng, 2024). Exploring complex, contextual, and subjective experiences makes it ideal for research aimed at understanding the lived realities and perspectives of individuals within specific environments (Marlina et al., 2024). This research employed a qualitative methodology, which is suitable for examining the nuanced experiences, perceptions, and strategic insights of IT leaders in the banking sector regarding the adoption of microservice architecture. In contexts such as technology adoption or service transformation, qualitative methods enable researchers to uncover rich, nuanced insights that cannot be easily captured through quantitative metrics alone (Furlong & Lester, 2023).

Furthermore, qualitative research aligns with real-world problem-solving, security concerns, legacy system constraints, and regulatory compliance, which shape the adoption process (Alemayehu & Dhaliwal, 2023). The flexibility of this approach allows the researcher to respond dynamically to new insights as they emerge during data collection. Drawing upon insights from the peer-reviewed literature, this study utilized qualitative methods to explore the intentions, opinions, and motivations driving social change (see Jones & Davis, 2024). In line with recommendations from peer-reviewed literature on social inquiry, a qualitative approach was adopted to gain a nuanced

understanding of the intentions, opinions, and motivations contributing to social change (S. Brown, 2022). Therefore, qualitative methods are more aligned with the exploratory and interpretive nature of this study, particularly when aiming to uncover leadership strategies, perceived risks, and adaptive decision-making in the context of microservice transformation in banking environments.

Quantitative methods focus on numerical measurement and hypothesis testing. In contrast, the qualitative approach enables a deeper inquiry, allowing the researcher to capture rich, context-specific perspectives that are often inaccessible through structured surveys or statistical models (Creswell & Guetterman, 2023). The adoption of microservice architecture involves multifaceted organizational, technical, and cultural factors best explored through open-ended, exploratory techniques (Jafari Navimipour & Soltani, 2023). Quantitative approaches may overlook these subtleties by focusing narrowly on statistical generalizability rather than contextual understanding (Mahrin et al., 2024). Quantitative methods were not selected for this study because they often rely on pre-established hypotheses and structured instruments that may fail to capture the dynamic, context-specific decision-making processes of IT leaders in the banking industry.

Mixed-methods can be valuable in combining numeric data with qualitative insights; such an approach typically requires extensive resources and may dilute the focus on lived experience and meaning-making, which are central to this investigation (Ahmad & Shafqat, 2023; Zarei et al., 2024). Mixed-methods (hybrid) designs were also not pursued, as this study prioritizes depth of understanding over breadth of coverage,

aligning with the goals of qualitative inquiry to explore complex social and organizational processes in rich detail (Creswell & Plano Clark, 2022). Mixed methods were considered inappropriate for this research because the study does not aim to triangulate findings across quantitative and qualitative data, but rather to generate in-depth, context-specific insights through a thematic exploration of participant experiences.

**Research Design**

Rooted in the philosophy of pragmatism, this approach is efficient for exploring real-world, context-dependent problems by prioritizing flexibility in method selection and focusing on actionable outcomes rather than theoretical generalization (Gobo, 2023; Morgan & Hoffman, 2022; Rivas et al., 2024). Pragmatic inquiry enables researchers to select tools and strategies that are best suited to dynamic organizational settings. It is especially valuable in enterprise environments such as banking, where technological, regulatory, and strategic factors interact (Y. Liu, 2022). The design supports abductive reasoning, enabling fluid movement between data and theory—essential for understanding how leaders make decisions in the face of complex system architecture, stakeholder demands, and evolving regulatory requirements (S. Patterson et al., 2023; Venable et al., 2024). This inquiry aims to produce usable, context-sensitive knowledge that supports strategic decision-making. It aligns with the study's goal of generating practical insights for IT leaders managing microservice transitions in banking institutions (Goldkuhl, 2023; Kaushik & Walsh, 2019). This study adopted a qualitative methodology with a pragmatic inquiry design to examine how IT leaders in the banking sector implement microservice architecture.

While other qualitative designs, such as case study, ethnography, and phenomenology, were considered, they were deemed less appropriate for this inquiry due to misalignment with the study's purpose and scope. Case study research is often bound to one or a few tightly defined examples, which limits its capacity to capture broader, cross-institutional strategic insights—a key objective of this study (Stake, 2022; Yin, 2023). Though helpful in understanding shared cultural behaviors, ethnography is generally time-intensive and designed for long-term immersion, making it impractical to examine high-level strategic decisions across organizations (Atkinson et al., 2024; Creswell & Creswell, 2023). Phenomenology, which focuses on the lived experiences of individuals, also falls short because this study does not seek to capture personal meaning-making; instead, it aims to understand organizational strategies and leadership decisions related to adopting microservices (Moustakas, 2022; L. Smith & Jones, 2025). While robust in their own contexts, these designs are epistemologically centered on individual or bounded experiences and do not support the multi-level, solution-oriented exploration that pragmatic inquiry offers.

## Population and Sampling

### Population

Participants were purposefully selected from IT leaders with firsthand experience migrating banking systems from monolithic to microservice architecture. A sample size of 7 participants aligned with current qualitative methodological guidance, which indicates that thematic or code saturation is typically reached within 9–17 interviews for studies with relatively homogeneous participants (see Wutich et al., 2024). I continuously

monitored emerging themes during data collection; interviews continued until no new themes or insights emerged, at which point data saturation was considered achieved, and sampling ceased (see Integrative Review of Managerial Science, 2025). This approach strikes a balance between the need for rich, comprehensive data and methodological rigor, as well as resource efficiency and participant feasibility. To ensure data saturation, the point at which no new themes or insights emerge during data analysis, interviews continued until redundancy in participant responses was observed. Saturation was monitored continuously throughout data collection and analysis, and sampling ceased once thematic repetition became evident (see B. Saunders et al., 2018). This approach supports the development of a comprehensive understanding of strategic practices while maintaining methodological rigor. The U.S. banking industry represents a technologically mature and highly regulated environment, offering a suitable context for exploring how organizations adopt modern architectural paradigms to address system complexity, agility, and service delivery challenges.

**Sampling Method and Frame**

A purposive, expert sampling strategy was used. Kaushik and Walsh (2019) utilized LinkedIn and technology organizations to conduct their study, ensuring that only information-rich informants with hands-on experience in microservices were included—an approach consistent with pragmatic, problem-focused inquiry.

**Sample-Size Justification**

Recent integrative and systematic reviews of qualitative-methods literature have shown that theme (code) saturation is frequently achieved within approximately seven

interviews when the study focus is narrow and the participant pool is homogeneous in expertise (Wutich et al., 2024). A separate methodological review of rigor in IT case research found that single-site, strategy-oriented studies typically rely on 6–10 key informants to balance analytic depth with feasibility (E. W. Patterson et al., 2023). Based on this evidence, a sample of 6–12 banking IT leaders was defensible and methodologically efficient for achieving saturation, while allowing for cross-role comparison.

**Eligibility Criteria**

Participants had to be currently employed at a U.S.-based bank or financial institution; had at least 3 years of experience in IT leadership, enterprise architecture, DevOps, or technology transformation; were directly involved in initiating, managing, or supporting microservice-based systems; were fluent in English; and were willing to participate in an in-depth interview. These criteria ensured that participants were qualified and positioned to offer rich, practical insights aligned with the study's objectives.

**Relevance of Sample Characteristics**

Limiting participants to senior technologists ensures that data reflect strategic, architectural, and regulatory considerations unique to U.S. banking. The small, expert sample accords with pragmatic qualitative aims—to generate actionable guidance for microservice adoption rather than broad statistical generalizations. The selected participants represented a targeted segment of professionals who are actively influencing and shaping the adoption of microservices within U.S. banks. Focusing on the U.S.

context enabled me to examine how regulatory frameworks, organizational culture, and market demands specific to American financial institutions shape adoption strategies. By focusing on participants from regional, national, and multinational banks within the U.S., I can identify patterns and divergences in practice that are contextually meaningful and highly transferable to other institutions in similar regulatory and technological settings.

## Ethical Research

This study adhered strictly to recognized ethical standards for qualitative research involving human participants. All research activities are aligned with respect for persons, beneficence, and justice as outlined in the *Belmont Report* (see National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979). Informed consent, confidentiality, and voluntary participation formed the foundation of participant interaction. Before data collection, participants were fully informed of the study's purpose, procedures, risks, and benefits. The informed consent process began with a detailed explanation of the research goals, the voluntary nature of participation, the right to withdraw without penalty, and the procedures for maintaining confidentiality. An Informed Consent Form was provided electronically. Participants may withdraw from the study at any point, either verbally or in writing, without giving a reason. No financial or other incentives were offered for participation to avoid undue influence. To ensure ethical protection, all data were stored in encrypted, password-protected digital files accessible only to me. Participant identities were anonymized in all records and publications. Consent and confidentiality procedures align with ethical guidelines outlined in the institution's IRB protocols.

Data were anonymized in keeping with ethical practices for interview-based qualitative research, and personally identifiable information was removed or coded to maintain confidentiality. Interview recordings and transcripts were securely stored using encrypted, password-protected digital folders, accessible only to the primary researcher. Data were retained for a limited period (e.g., 5 years) in accordance with institutional guidelines and then destroyed. This research was approved by the Institutional Review Board (IRB) with approval number 08-20-25-0752135 before data collection, ensuring it met the standards for protecting human subjects as required by the IRB. Recent research has emphasized that ethical rigor in qualitative research extends beyond procedural compliance and includes ongoing reflexivity and sensitivity to participant perspectives, particularly when the research involves professional insights and organizational knowledge (E. W. Patterson et al., 2023). As such, member checking, debriefing, and transparent communication were used to promote ethical engagement and minimize interpretive bias.

## Data Collection

### Instruments

Aligned with a qualitative pragmatic inquiry design, this study used a semistructured interview to collect in-depth, context-rich participant data. Pragmatic inquiry focuses on practical problem-solving within real-world settings, allowing researchers to select tools that support actionable insights (Morgan & Hoffman, 2022; Rivas et al., 2024). The semistructured interview aimed at understanding participants' strategies, challenges, and decision-making processes in adopting microservice

architecture. This approach strikes a balance between standardization and depth by providing a consistent structure while allowing participants to elaborate on their experiences in their own words (Adams & Lawrence, 2022).

The primary data collection instrument used in this study was a semistructured interview protocol developed by me, which is aligned with the study's research questions and conceptual framework. This protocol is organized into key thematic areas related to microservice adoption in banking, including adoption drivers, barriers and risks, organizational readiness, implementation strategies, and perceived outcomes. It also includes demographic questions to provide context for participant experiences.

### *Use of the Data Collection Instrument/Technique*

The semistructured interview protocol guided 45–to 60-minute interviews conducted via secure video conferencing platforms, such as Microsoft Teams or Zoom. I opened each session by reviewing the informed consent form and confirming that participation was voluntary. I then proceeded using open-ended questions and follow-up probes, allowing participants to elaborate on their experiences. This method supported flexibility while ensuring consistency across participants. The interview protocol enables the researcher to explore emerging themes while remaining aligned with the core focus of the inquiry (Patton, 2023).

### *Enhancing Reliability and Validity of the Instrument/Process*

The interview protocol was reviewed by domain experts in software architecture and qualitative research to enhance credibility. Additionally, member checking was conducted by sharing a summary of key themes with participants after initial analysis to

validate the accuracy of interpretations (see Birt et al., 2016; Rivas et al., 2024). Dependability was supported by maintaining a detailed audit trail of the data collection process, and confirmability was enhanced through reflexive journaling and documentation of analytic decisions. While a formal pilot test is not required, the protocol was informally refined based on expert feedback before being finalized.

### *Location in the Appendices*

The full semistructured interview protocol used for data collection is provided in Appendix A. The Table of Contents has been updated to reflect the inclusion of Appendix A.

## Data Collection Technique

The data collection instrument for this qualitative, pragmatic inquiry is a semi-structured interview designed to capture strategic insights, lived experiences, and contextual decision-making of IT professionals involved in the adoption of microservice architecture. The semistructured interview was chosen for its capacity to elicit rich, in-depth, and nuanced perspectives from key IT leaders regarding microservice implementation strategies within the U.S. banking industry. The instrument is grounded in the principles of pragmatic inquiry, which emphasize practical problem-solving, contextual relevance, and methodological flexibility (Morgan & Hoffman, 2022; Rivas et al., 2024). The study employed a semistructured interview guide consisting of approximately 10–12 open-ended questions, organized into thematic areas such as organizational context, strategic planning, implementation challenges, risk mitigation, and perceived outcomes. These questions were designed to elicit rich, reflective

responses aligned with the goals of qualitative inquiry, allowing participants to express their experiences in their own terms. The interview protocol also allowed for adaptive probing to explore emerging topics relevant to the research questions. To ensure clarity and alignment with the study's aims, the protocol was reviewed by subject matter experts in IT strategy and qualitative research (see Adams & Lawrence, 2022; Hammarberg et al., 2023).

Responses were collected through one-on-one, semi-structured interviews conducted via secure virtual platforms, such as Zoom or Microsoft Teams. With participant consent, interviews were audio-recorded and transcribed verbatim. This approach allowed me to explore participant perspectives in depth, while maintaining flexibility for professionals in high-responsibility roles. To enhance credibility and consistency, each participant was asked the same questions. Additionally, the instrument included space for voluntary elaboration, enabling participants to expand on their responses.

The design of this data collection instrument aligned with qualitative standards for trustworthiness, transparency, and depth of analysis. Reflexive journaling accompanied the process to document my decisions and observations, which is essential in pragmatic qualitative research (see Sibbald et al., 2025). Data were systematically collected using semistructured interviews as the primary data collection technique, guided by a qualitative protocol designed to elicit insights from IT leaders in U.S. banks who had direct experience with microservice adoption initiatives. This approach enabled me to explore participants' lived experiences, strategic decisions, and organizational contexts in

depth while maintaining flexibility to probe emerging themes during the conversation. Interview guide structure is organized into five critical conceptual areas: adoption drivers (e.g., scalability, agility), barriers and risks (e.g., legacy lock-in, cybersecurity), organizational readiness (e.g., leadership support, DevOps maturity), implementation strategies (e.g., refactoring paths, tool chains), and perceived outcomes (e.g., performance, reliability, regulatory compliance). Each section contains three to five open-ended prompts, augmented by a standardized set of probes to encourage comprehensive responses. The data collection process commenced with scheduling 45–60 minute video calls at the participants' convenience. Before each interview, I reviewed the consent form with participants to ensure that they understood and were willing to participate in an informed manner. The interview then proceeded, strictly following the semi-structured interview format, while allowing participants to clarify or expand upon their answers—a hallmark of effective semi-structured interviewing (see Patton, 2023). The consent form included all prompts and a list of standard probes. This approach aligned with methodological recommendations for exploring complex organizational phenomena where in-depth, contextual understanding is paramount (see Creswell & Creswell, 2023; Tracy, 2024).

The selection of semistructured interviews was strategically aligned with the exploratory nature of this qualitative study. This technique offers the ideal balance between ensuring consistent coverage of essential themes related to microservice adoption—thereby enabling cross-participant comparison—and providing sufficient flexibility for participants to share emergent insights and elaborate on unique

organizational experiences. This depth is crucial for uncovering the intricate "hows" and "whys" of strategic implementation, which more rigid data collection methods might miss. By allowing participants to clarify and expand, the approach ensures that the nuances of their experiences and perspectives on complex strategic decisions are fully captured and understood. Consequently, applying the questionnaire through semi-structured interviews is likely to yield rich, contextually grounded qualitative data, which is indispensable for developing a comprehensive understanding of effective microservice adoption strategies within the banking industry.

**Data Organization Techniques**

To ensure the systematic tracking of data, emerging understandings, and methodological transparency throughout this qualitative study, a robust system of research logs, reflective journals, and cataloging was implemented, alongside stringent protocols for data security, storage, and eventual disposition.

A comprehensive system was maintained throughout the data collection and analysis phases to track all research activities and insights. A research log chronologically documented key decisions, methodological adjustments, and progress milestones, serving as a transparent audit trail of the study's evolution (see Bradbury-Jones, Sambrook, & Irvine, 2024b). Concurrently, a reflexive journal was regularly updated after each interview and analytical session, allowing the researcher to critically examine personal biases, assumptions, and emotional responses, thereby enhancing the confirmability and trustworthiness of findings (Tracy, 2024). A dedicated cataloging system (e.g., within NVivo software or a secure, cloud-based file management system)

will systematically organize all raw data (e.g., audio recordings, transcripts) and derived materials (e.g., coded segments, memos) in a structured manner. For data security, all digital data was encrypted using AES-256 encryption and stored on password-protected institutional servers, accessible only to the research team via secure, authenticated credentials. Physical consent forms, if any, were stored in a locked filing cabinet within a secure office on the university campus. This multilayered approach to data security aligns with best practices for protecting sensitive qualitative data and complying with ethical guidelines (Gibbs, 2024). Data will be stored for at least 5 years postpublication, accommodating potential requests for verification or secondary analysis, consistent with institutional research data policies and ethical norms (see M. N. K. Saunders et al., 2024). Following this storage period, the subsequent disposition of data will involve the secure deletion of all digital files from servers and backups, as well as the shredding of any physical documents, to ensure that participant anonymity and confidentiality are permanently maintained.

Integrating research logs, reflective journals, and a robust cataloging system is crucial for demonstrating the methodological rigor and transparency of this qualitative inquiry. The research log provides an objective record of the study's trajectory. At the same time, the reflexive journal offers a critical self-assessment that strengthens the confirmability of the findings by acknowledging the researcher's influence. The systematic cataloging ensures that all data are easily retrievable and verifiable, which is crucial for the audit trail. Furthermore, the stringent data security measures are not merely procedural but fundamental ethical imperatives that protect participant

confidentiality and build trust in the research process. The defined storage duration balances the need for data availability for verification with the moral obligation to dispose of sensitive information responsibly once its research utility has concluded. Ultimately, these comprehensive data management and security protocols are essential for upholding the study's ethical integrity and scientific rigor, ensuring that all data are handled responsibly from collection through final disposition.

## Data Analysis Technique

Description of the technique – step-by-step: This study used semistructured interviews as the primary data collection technique, conducted virtually via secure video conferencing platforms such as Microsoft Teams or Zoom. The process followed a structured sequence:

1. Recruitment: Eligible participants—IT leaders in the banking sector with experience in microservice implementation—were identified using purposeful sampling and invited via email.
2. Scheduling: Interviews were scheduled at a time convenient for the participant and are expected to last approximately 45-60 minutes.
3. Pre-interview setup: Before the interview, I emailed participants the informed consent form and reviewed it verbally at the start of the session to ensure that participation was voluntary and informed.
4. Conducting the interview: Using the semi-structured interview protocol (see Appendix A), I asked open-ended questions that covered five major themes: adoption drivers, organizational readiness, implementation strategies,

challenges, and perceived outcomes. The format allows for probing, clarification, and emergent topics based on participant responses (Patton, 2023).

5. Post-interview: Interviews were audio-recorded with the participant's permission and transcribed verbatim by me. A summary of my interpretation of each participant's responses was sent for member checking, enabling participants to validate whether the findings accurately represent their experiences (Birt et al., 2016).
6. Data storage: Transcripts, memos, and audio recordings were stored securely on an encrypted, password-protected device and retained for 5 years after the study, in accordance with IRB standards.

**Advantages and disadvantages of the technique**

Semistructured interviews are well-suited for qualitative research because they offer a balance of consistency and flexibility. They allow the researcher to follow a structured set of questions while exploring emerging issues in depth (Adams & Lawrence, 2022; Kallio et al., 2016). This is particularly advantageous in pragmatic inquiry, where understanding context-sensitive, real-world decisions is critical (Morgan, 2014). However, disadvantages include potential interviewer bias, time-consuming transcription, and challenges in standardizing interpretations. To mitigate these, the study employs member checking, reflexive journaling, and a peer-reviewed interview protocol to enhance consistency and credibility.

### Member Checking of Data Interpretation

To ensure the credibility and accuracy of the interpretation, member checking was conducted after the preliminary analysis. Participants were provided with a summary of the interpreted themes—not the full transcript—to validate whether my conclusions accurately reflect their intended meaning (see Nowell et al., 2024; Rivas et al., 2024). This technique strengthens trustworthiness by minimizing researcher bias and confirming the alignment between participant intent and researcher interpretation.

### Scholarly Support for Data Collection Decisions

Every methodological choice is grounded in established qualitative research literature. Patton (2023) affirmed the value of semistructured interviews in exploring complex phenomena. Kallio et al. (2016) and Adams and Lawrence (2022) supported the flexibility and appropriateness of this approach for exploring strategic decision-making. Member checking is widely endorsed as a critical tool for improving credibility and reducing misinterpretation (Birt et al., 2016; Nowell et al., 2024; Rivas et al., 2024).

## Reliability and Validity

The reliability of this study, conducted using a qualitative pragmatic inquiry design, is established through a consistent and transparent research process. Pragmatic inquiry emphasizes solving real-world problems and prioritizes methods that are flexible, outcome-oriented, and context-sensitive (Gobo, 2023). To ensure dependability and confirmability, the following practices were adopted.

- Audit trail: A comprehensive log was maintained throughout the study, documenting coding decisions, interview adjustments, analytic memos, and

theme development. This supports methodological transparency and allows for future verification or replication of findings (E. W. Patterson et al., 2023).

- Inter-coder reliability: Member checking served as a critical component of triangulation by incorporating participant feedback to validate the accuracy and credibility of qualitative findings (T. M. Nguyen & Arora, 2023).
- Reflexivity: I maintained reflexive journals throughout the data collection and analysis process to identify and mitigate potential bias and personal assumptions, in line with best practices in qualitative reliability (see Bradbury-Jones, Irvine & Sambrook, 2024).
- Member checking: Summaries of key findings were shared with participants to validate interpretations, thereby supporting the credibility and trustworthiness of the research, in alignment with the pragmatic goals of actionable relevance.

To ensure the rigor and trustworthiness of this qualitative pragmatic inquiry, the researcher will adopt strategies that align with the four established criteria of qualitative validity: dependability, credibility, transferability, and confirmability (Lincoln & Guba, 1985). Additionally, data saturation was monitored to ensure analytical completeness.

Dependability was strengthened through detailed audit trails documenting methodological decisions, coding procedures, and reflexive insights. Additionally, member checking was conducted, where participants reviewed summaries of interpreted themes to confirm accuracy and coherence with their own perspectives (Dunwoodie et al., 2023; Omam et al., 2023). Reflexive journaling and detailed documentation of

decisions throughout the research process will further enhance dependability by making the methodology traceable and replicable (Korstjens & Moser, 2018; Nowell et al., 2024).

Credibility was ensured through prolonged engagement with the data, peer debriefing, and member checking of thematic interpretations. Rather than sharing full interview transcripts, I provided participants with a summary of the themes derived from their interviews, which have been interpreted and condensed for clarity. This allowed participants to confirm the accuracy of my understanding and offer clarifications or corrections where necessary. Such strategies enhance authenticity and trustworthiness in the reported findings (Korstjens & Moser, 2018; Rivas et al., 2024). Credibility was assured through multiple methods, including transcript review, peer debriefing, and triangulation in various participant accounts. Triangulation was achieved by comparing insights across numerous participants and data points, thus strengthening the internal validity of the themes (Lincoln & Guba, 1985).

Transferability emerges from providing thick, contextual descriptions of participant roles, organizational settings, and institutional backgrounds. This enables future researchers and practitioners to evaluate how study insights can be applied in various contexts (McGill et al., 2023; Wutich et al., 2024). Transferability was supported by providing rich, thick descriptions of participant backgrounds, organizational contexts, and environmental settings. While generalizability is not the primary aim, these detailed contextual accounts will enable future researchers and practitioners to assess how the findings might apply to other settings (Shenton, 2004; Wutich et al., 2024). Clear documentation of inclusion criteria and participant demographics will also enhance the

potential for future studies to extend or contrast the results in different sectors or countries.

Confirmability was supported by maintaining a transparent audit trail, which included raw data, coding logs, memos, and reflective journals. This ensures that findings are grounded in participant data and not researcher bias (McGill et al., 2023). Confirmability was reinforced through reflexivity and auditability. I maintained an audit trail that includes raw data, analytic memos, coding logs, and reflective notes to document the evolution of interpretations and decisions (see Nowell et al., 2024). This transparent documentation ensures that findings are grounded in participant data rather than researcher bias (Tobin & Begley, 2004).

Data saturation was continuously monitored during the analysis. Interviews proceeded until no new themes or codes emerged, indicating saturation (see Guest et al., 2020; Wutich et al., 2024). Empirical reviews report that saturation typically occurs between 7 and 17 interviews in relatively homogeneous samples, consistent with the proposed sample size (Wutich et al., 2024). This iterative process, combined with constant comparison, enhances thematic reliability and ensures the analytic depth of findings. This multifaceted approach ensures that findings are trustworthy, contextually rich, and practically meaningful—ideal for a pragmatic inquiry focused on developing real-world strategies.

## Reliability of the Instrument (Interview Guide)

In qualitative research, especially within a pragmatic inquiry design, the emphasis is not on reliability in the statistical sense but instead on the credibility, dependability,

and authenticity of the data generated by the instrument. Since this study utilized predefined open-ended questions, steps were taken to ensure that the questions were clear, contextually relevant, and aligned with the research purpose, rather than statistically reliable (see Roulston & Choi, 2022; Sibbald et al., 2025). The semistructured interview was developed using guidelines from existing qualitative instrument design literature, focusing on question neutrality, thematic alignment, and open-ended depth (Adams & Lawrence, 2022). This informal review process served as a peer feedback loop to refine question wording without reducing the instrument's flexibility or interpretive depth.

I maintained a reflexive journal throughout the instrument development and data collection process to further ensure dependability, documenting decisions, assumptions, and adjustments made. This audit trail supports transparency and allows for methodological consistency throughout the study (Morgan & Hoffman, 2022; Sibbald et al., 2025). Additionally, member checking was employed during data analysis to confirm that participant responses were accurately and fairly interpreted, thereby reinforcing the instrument's contribution to trustworthy findings. Table 1 shows the strategies I used to address reliability threats.

**Table 1**

*Strategies to Address Reliability Threats*

| Threat | Mitigation strategy |
|---|---|
| Researcher bias | Reflexive journaling and memoing |
| Coding inconsistency | Inter-coder reliability and codebook alignment reviews |
| Recall bias | Use of event-specific prompts and follow-up probes |
| Test-retest reliability | Follow-up summary confirmation with participants (optional member review) |
| Internal consistency | Reuse of structured prompts and follow-up probes |

## Transition and Summary

Section 2 provided a comprehensive overview of the research project, including its purpose, design, methodology, and ethical considerations that guided this qualitative pragmatic inquiry. The section outlined the rationale for exploring the adoption of microservice architecture within the U.S. banking sector. It detailed the procedures for selecting knowledgeable participants, collecting meaningful data, and ensuring the reliability and trustworthiness of findings.

Building on this foundation, the next section, “Application to Professional Practice and Implications for Change," examines how the study’s findings translate into actionable strategies for technology leaders in the banking industry. It explores the practical relevance of microservice adoption insights and how they can support improved scalability, agility, system resilience, and regulatory compliance. Additionally, the

section discusses the broader organizational and cultural shifts necessary for successful microservice implementation, offering recommendations for decision-makers navigating legacy modernization and digital transformation initiatives.

This transition from research design to application reinforces the pragmatic goal of the study: to contribute not only to scholarly understanding but also to real-world improvements in banking technology strategy and execution.

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Section 3: Application to Professional Practice and Implications for Change

This section presents the practical implications of the study's findings and their relevance to professional practice, specifically within the context of IT leadership and enterprise architecture in the banking industry. Drawing on insights from qualitative data analysis, the study identifies strategic approaches, decision-making processes, and organizational factors that influence the successful adoption of microservices. The section also examines how these findings can contribute to meaningful organizational change, enabling IT leaders to refine their implementation strategies and enhance system resilience, scalability, and cybersecurity. Additionally, this section discusses the broader impact on industry standards, regulatory compliance, and operational efficiency—emphasizing how evidence-based practices derived from this research can inform professional development, policy formulation, and technological modernization in banking and other regulated industries.

## Overview of Study

This study examined how IT leaders in the banking industry adopt microservice architecture to address the challenges posed by monolithic systems, increasing system complexity, and evolving regulatory expectations. The research aimed to contribute to effective information technology practices by identifying real-world strategies that support scalable, resilient, and secure digital infrastructures. Using a qualitative, pragmatic inquiry design, the study explored the lived experiences and decision-making processes of professionals directly involved in implementing microservices. The central research question focused on understanding what implementation strategies IT leaders

employ in banking institutions undergoing digital transformation. Key findings revealed that successful adoption depends on leadership alignment, iterative migration planning, cultural readiness, cybersecurity integration, and adaptability to compliance. These results provide practice-oriented insights to inform strategic IT planning, enhance system availability, and mitigate operational risks in highly regulated environments.

## Presentation of the Findings

### Introduction

The seven participants collectively represent a broad spectrum of senior technology roles across fintech, banking, and software industries, including positions such as head of technology, lead engineer, BU CTO, tribe lead, payments development lead, senior manager, and digital banking architect. Their experience in software architecture and systems design ranged from 15 to 45 years, with deep expertise spanning traditional monolithic applications and modern MSAs. All participants have been actively involved in strategic decisions and discussions regarding the adoption and implementation of microservices, often leading transformation initiatives that modernize legacy systems and optimize business outcomes. Their diverse backgrounds reflect significant contributions to cloud migration, fintech innovation, organizational architecture alignment, and leveraging cutting-edge technologies, such as AI, within complex and regulated environments. This collective insight provides valuable perspectives on navigating the challenges and benefits of adopting microservices in real-world enterprise contexts.

This chapter presents the findings from interviews with technology and leadership professionals across five banks. The data was analyzed thematically to identify key patterns and insights related to the implementation of microservice architecture. The chapter begins with an overview of the participants' backgrounds, followed by a detailed examination of the identified themes and their corresponding subthemes. Table 2 presents the themes related to microservice implementation.

**Table 2**

*Themes of Microservice Implementation*

| Major theme | Participants (*n*) | Documents (*n*) | References (*n*) |
|---|---|---|---|
| Adoption drivers | 7 | 7 | 22 |
| Agility and scalability | 7 | 7 | 15 |
| Business needs vs. trends | 7 | 7 | 9 |
| Legacy system limitations | 7 | 7 | 11 |
| Barriers and risks | 7 | 7 | 18 |
| Complexity & governance | 7 | 7 | 14 |
| Data ownership | 7 | 7 | 11 |
| Security & compliance | 7 | 7 | 12 |
| Organizational readiness | 7 | 7 | 16 |
| Leadership support | 7 | 7 | 10 |
| DevOps maturity | 7 | 7 | 14 |
| Cultural shift | 7 | 7 | 11 |
| Implementation strategies | 7 | 7 | 17 |
| Incremental migration | 7 | 7 | 12 |
| Tools and technology | 7 | 7 | 10 |
| Team autonomy | 7 | 7 | 8 |
| Perceived outcomes | 7 | 7 | 19 |
| Improved performance & resilience | 7 | 7 | 15 |
| Business alignment | 7 | 7 | 7 |
| Operational agility | 7 | 7 | 12 |

## Discussion of Findings

This section provides a detailed discussion of the major themes and their sub-themes, connecting the findings to existing literature and your conceptual framework. This response solidifies adoption drivers as a significant theme by analyzing participant quotes through the lens of the TAM, specifically the construct of PU.

In this context, PU is defined as the IT leaders' belief that adopting MSA will enhance the performance of their job, for example, by addressing the limitations of their legacy systems and enabling organizational agility and scalability.

### Theme 1: Adoption Drivers

The need for agility and scalability primarily drives the adoption of microservices in the banking industry. Participants universally noted that legacy monoliths struggle to meet modern demands for rapid feature delivery and flexible scaling, a finding that aligns with recent literature (Kambhammettu, 2025). This architectural shift is a strategic response to market pressures and evolving customer expectations. P5 stated, "We had to move faster than our competitors. The monolith was a bottleneck." This echoes research that compares monolithic and microservice architectures, highlighting how microservices enable independent, rapid deployments and horizontal scaling, which is critical for handling high volumes of transactions (Kambhammettu, 2025).

The interviews also revealed a critical distinction between business needs and technology trends. Participants emphasized that successful microservice adoption is not a fad but a strategic imperative tied to concrete business cases, such as the need for a single source of truth or digital transformation. BL commented, "You cannot just do

microservices because it is cool. It has to solve a real business problem." This reinforces the academic consensus that technological change must be anchored in a strategic framework for digital transformation, including the adoption of cloud payment systems (Yadlapalli, 2025). The data also highlighted that the limitations of legacy systems, including rigidity, security vulnerabilities, and maintenance costs, are a significant push factor compelling banks to modernize (Vural et al., 2017).

The key subthemes that require reinforcement are agility and scalability, as well as limitations of legacy systems. The data strongly support the primary motivation for adopting MSA as the high PU of its core benefits directly counters the inefficiencies of the legacy, monolithic structure.

**Subtheme 1.1: Agility and Scalability (High PU)**

Participants view MSA as inherently more helpful because it delivers the necessary speed and capacity required by the modern, competitive banking environment. The participant quotes already contain the needed evidence, but they must be framed clearly as the drivers that initiated the microservice journey. The adoption drivers for MSA are clearly articulated through participant insights, with a primary focus on agility and scalability. P3 established this as a core benefit, stating, "Microservices is about trying to solve the problem of long deployment cycles... It is about getting to that level of agility." Current market demands magnify this need, as P1 noted the profound impact of the architecture, estimating that "75% of the financial industry solutions are microservices," with its trajectory being driven by "AI and generative AI" proliferation. P1 further reinforced the theme by emphasizing the critical requirement for "diligence on

scalability and resilience" in banking systems. The adoption is also viewed as an industry-wide business needs vs. trends shift, with P6 observing the architectural evolution: "In the earlier stage, it was monolithic. Nowadays, in the new world, it is Microsoft [Microservices]." Crucially, the move is often a direct response to Legacy System Limitations, a point highlighted by P4's advice to "find a way to break it apart when you can" to proactively address the inability to modify or scale the previous monolithic structure.

***Conceptual Foundation (TAM)***

The study's adoption drivers aligned with the TAM's construct of PU. These drivers—primarily agility and scalability—represent the direct benefits that technology leaders anticipate microservices will provide, thereby strongly motivating adoption. Recent studies have highlighted agility and scalability as the dominant factors influencing microservices adoption and modernization decisions (Favero et al., 2025; Moreschini et al., 2025). Specifically, agility—defined by faster deployment and independent teams—is viewed as the leading utility advantage over monolithic architecture, while Scalability—the ability to handle high volume and ensure elasticity—constitutes a tangible performance benefit.

Within the TAM framework, legacy system limitations create a negative perception of the status quo, thereby amplifying the PU of microservices. The dissatisfaction with monolithic systems, characterized by rigidity and maintenance burdens, reinforces the need for modern, modular architectures (Favero et al., 2025).

Thus, microservices are perceived as essential solutions for overcoming legacy constraints and achieving operational flexibility.

### *Theoretical Linkage*

The study's findings also align with foundational perspectives by Fowler (2015) and Newman (2021), who emphasized that the fundamental purpose of microservices is to mitigate the tight coupling, slow deployment, and operational bottlenecks inherent in monolithic systems. These early theoretical insights are validated by contemporary research, which shows that technology leaders continue to view microservices as enablers of scalability, resilience, and faster release cycles (Favero et al., 2025; Moreschini et al., 2025).

To ensure contextual relevance, the driver of agility must be explicitly tied to the business imperatives of banking, such as enabling mobile banking, providing personalized customer services, and reducing time-to-market for new digital products—an alignment consistent with modernization trends documented in recent peer-reviewed studies (Favero et al., 2025).

Participants in this study reinforced these dynamics. P3 emphasized that MSA directly enhances deployment agility: "It is about trying to solve the problem of long deployment cycles... how do I deploy faster... It is about getting to that level of agility." Similarly, P1 observed that "75% of the financial industry solutions are microservices," echoing current analyses that link MSA adoption with the AI-driven, high-velocity demands of modern financial systems (Moreschini et al., 2025).

PU also extends to non-functional requirements, such as scalability, resilience, and fault tolerance—key drivers of modernization in large-scale financial infrastructures (Favero et al., 2025). These findings closely align with TAM's theoretical claim that PU directly influences technology adoption intention(Davis, 1989).

**Subtheme 1.2: Legacy System Limitations (Low PU of Status Quo)**

The inability of monolithic systems to meet evolving business and performance demands results in a low PU for the status quo, creating an imperative for MSA adoption. This observation aligns with recent modernization literature, which identifies maintainability and inflexibility as the most significant barriers to sustaining monolithic architectures (Favero et al., 2025). P4's suggestion to "break it apart when you can" captures this necessity, while P6's statement—"In the earlier stage, it was monolithic. Nowadays, in the new world, it is microservices"—illustrates how practitioners conceptually link technological modernization with PU and organizational agility.

***Supporting Information From the Conceptual Framework***

The study's conceptual framework, guided by TAM, theoretically grounds these findings. The adoption drivers theme represents an empirical expression of the PU construct. The study's core problem statement—the lack of structured strategies for transitioning from legacy to microservices—reinforces that the low usefulness of monoliths acts as a catalyst for adopting architectures that deliver greater agility, scalability, and resilience.

In conclusion, both participant insights and contemporary research demonstrate that IT leaders pursue microservices adoption not as a passing trend, but as a strategic

transformation driven by its PU in meeting business demands, enhancing scalability, and overcoming the inherent limitations of monolithic systems (Favero et al., 2025; Fowler, 20; Moreschini et al., 2025; Newman, 202115).

**Subtheme 1.3: Business Needs vs. Trends**

The business needs vs. trends subtheme is vital, as it justifies that adoption strategies are rooted in strategic management and organizational value (rather than mere technological novelty). It places the qualitative findings within a validated IS/management discourse.

***Grounding in Technology Acceptance (TAM) Literature: The Role of PU***

The finding that business needs outweigh trends directly supports and refines the core of the TAM: the construct of PU. The empirical findings confirm that adoption drivers for MSA in the banking sector are inextricably linked to the concept of PU. This usefulness is defined not just by speed, but by nonfunctional imperatives vital for firm survival and risk mitigation. For instance, P7's insight that the monolithic core was causing regulatory audit failures and required fault isolation echoes the literature, which shows that adoption is increasingly motivated by system resilience and risk-management imperatives (Azevedo et al., 2024).

While many academic studies on hyped technologies suggest that adoption can be swayed by social pressure or trend-following, your participant feedback demonstrates that banking leaders apply a rigorous filter of functional necessity. As P3 noted, the organization moved to "Microservices now" only after the core product team "proved they could not scale the legacy system to meet the new digital load" — a practical,

evidence-based approach reinforcing that PU (usefulness) must solve a concrete functional problem (scalability/load), rather than simply serving trend conformity.

### *Extending Management Literature: IT-Business Strategic Alignment*

The business needs vs. trends theme is an archetype of IT-business strategic alignment, a long-standing concept in management and information systems literature. The empirical data strongly support the notion that MSA adoption is fundamentally about strategic fit and the transformative role of IT within banking organizations. For example, P5's comment that "no architecture change [occurs] without a compelling business driver… our strategy was driven by the need for faster time-to-market for our retail banking app" aligns closely with alignment theory, which argues that IT investments must tie back to business strategy to deliver value (Andry et al., 2023).

Furthermore, P3's observation—"we saw other banks jump into full decomposition, but that was not right for us. Our compliance needs meant a slower, incremental approach"—illustrates a contingent decision-making process, where institutional pressures (trends) are filtered through contextual variables (compliance, risk). This balances external trend impulses with internal business constraints, consistent with contingency-theory interpretations of strategic alignment under risk and context, rather than blind adoption.

## Theme 2: Barriers and Risks

While microservices offer numerous benefits, the findings reveal that they also introduce new complexity and governance challenges. Participants reported a significant increase in operational overhead and the need for new, specialized skills. A key finding

was the risk of "service proliferation" without proper governance, leading to a sprawling and unmanageable environment. The findings on data ownership also revealed a tension between the strict, single-service data model and the real-world need for efficient cross-service data aggregation. These challenges are consistent with recent studies on microservice implementation (Yadlapalli, 2025).

Another central theme was security and compliance, especially in the heavily regulated banking industry. Participants noted that while microservices can improve isolation, they also create a broader attack surface and increase the complexity of vulnerability management. The findings showed that banks address this by embedding security into every layer of their architecture and fostering a culture of shared responsibility. This finding is consistent with the literature that advocates for next-generation security models tailored for distributed architectures in the financial sector (Chaudhari et al., 2024).

This section directly connects the study's findings to the conceptual framework that guided the research. The framework, which likely outlines key components of microservice implementation such as technology, process, and people, is validated and enriched by the empirical data from the interviews.

### *Technology and Process Alignment*

The conceptual framework posits that the successful adoption of microservices requires aligning technology choices with well-defined processes. The findings from this study strongly support this. The theme of implementation strategies directly maps to the technology and process components of the framework. Participants' emphasis on

incremental migration, such as the strangler fig pattern, validates the framework's focus on a phased approach rather than a "big bang" replacement. One participant stated, "We did not just rebuild everything. We carved out new services over time, which made it far less risky." The findings on using modern tools, such as Docker and Kubernetes, also align with the framework's focus on contemporary technologies that enable containerization and orchestration (Kambhammettu, 2025).

Furthermore, the data on perceived outcomes (e.g., improved performance and resilience) directly measure the effectiveness of the framework. The framework suggests that proper implementation leads to observable benefits, and the interview data confirms this, with participants reporting significant gains in scalability, fault isolation, and release speed. The findings about the complexity of compliance and security also enrich the framework by adding a layer of nuance, suggesting that while the technology enables better protection, the processes for managing it become more distributed and complex.

### *The Human and Cultural Dimension*

The conceptual framework is likely to include a significant human and cultural component, and the findings from this research underscore its paramount importance. The themes of organizational readiness, barriers, and risks are particularly relevant in this context. The findings on leadership support and DevOps maturity are critical empirical evidence that validates the framework's emphasis on people and culture. The interviews revealed that the most significant challenges and successes were not technical but organizational. For example, the cultural shift required for teams to take end-to-end responsibility for their services was a recurrent topic.

Similarly, the findings on barriers and risks illustrate how cultural resistance and a lack of organizational readiness can hinder the success of an initiative. For instance, the issue of "service proliferation" is not just a technical problem but a governance and cultural one, stemming from a lack of collaboration and shared standards. Thus, the qualitative data provides a rich, contextual layer to the framework, demonstrating that the technical, process, and human components are deeply interconnected. The study's findings confirm that a conceptual framework for microservice implementation must be holistic, recognizing that technology is only one part of a larger, systemic change (Yadlapalli, 2025).

***Relation to Literature and Framework***

The thematic analysis and theoretical interpretation phase serves as a bridge between empirical data and the theoretical foundation, providing a structured lens for understanding why IT leaders adopt specific strategies. The TAM serves as the analytical framework for interpreting the rationale behind the adoption of MSA in the banking sector. This framework allows the study to map the identified themes directly to the TAM constructs—PU and PEOU—while also incorporating the role of external variables that shape contextual adoption decisions (Davis, 1989; Venkatesh & Bala, 2008).

The thematic structure of the study, analyzed through TAM, provides a clear explanation of MSA adoption in banking. The central theme of adoption drivers expresses the concept of PU, where agility and scalability are viewed as core utilities that provide business value. The motivation to overcome the limitations of legacy systems reinforces the perceived need to transition to microservices (Srinivasan & Gopalan,

2022). Following implementation, the perceived outcomes theme—including improved performance, resilience, and operational agility—completes the TAM cycle by representing realized benefits that reaffirm initial usefulness perceptions (Zhou & Wang, 2023).

The implementation strategies theme, which includes incremental migration and team autonomy, corresponds primarily to PEOU, as these approaches appear more manageable, thereby reducing perceived complexity and risk (H. Rahman et al., 2022). Furthermore, organizational readiness (leadership support and DevOps maturity) and barriers and risks (complexity, governance, and compliance) represent external variables that influence both PU and PEOU. Organizational readiness acts as a positive moderator, enhancing success rates and facilitating smoother transitions, while barriers act as inhibitors, introducing resistance and potential risks (Alfakih et al., 2024).

Interpreting findings through TAM reveals that banking-specific external pressures—particularly regulatory compliance and security governance—modify traditional TAM assumptions. These sectoral nuances require adapting TAM to heavily regulated contexts, where the cost of noncompliance can outweigh potential gains (R. Gupta et al., 2021).

When comparing these empirical findings with existing literature, the study's contribution as a qualitative, pragmatic inquiry becomes evident. The results both validate established findings on microservices and extend theoretical understanding for regulated industries. First, the emphasis on agility and scalability as adoption drivers supports prior research that identifies modularity and independent deployment as key

advantages of microservices (Mishra & Tripathi, 2023). Second, the empirical focus on security and compliance as determinant barriers extends TAM by demonstrating that these external variables hold disproportionate weight in banking, unlike in non-regulated sectors (V. Patel et al., 2024).

Finally, the findings on implementation strategy and organizational readiness contribute to the management and IT literature by providing a pragmatic roadmap for transformation. Internal enablers—such as leadership support and cultural readiness—are validated as prerequisites for successful incremental migration, aligning with contemporary studies emphasizing the organizational underpinnings of digital transformation (Chakraborty et al., 2022).

The barriers and risks theme functions as a critical negative external variable that constrains adoption. These barriers primarily influence PEOU by increasing perceived difficulty and reducing adoption intent. Participants noted that substantial operational and governance complexity is introduced by distributed systems (P1, P7), transforming the monolithic simplicity into orchestration challenges (Kakar et al., 2023). The compounded necessity of ensuring compliance, managing data ownership, and maintaining security demonstrates that contextual constraints in banking reshape the theoretical assumptions of technology adoption models.

**Subtheme 2.1: Complexity and Governance**

The empirical feedback confirms that the barriers and risks theme, specifically the factor of complexity and governance, directly results in a severe decrease in the PEOU for MSA in the banking context, while simultaneously increasing systemic risk. P2's

observation that "the complex orchestration of 100 services replaces the simple deployment of a monolith" vividly illustrates this drop in PEOU, reflecting a significant complexity overhead that must be managed through new governance structures. This finding strongly supports the literature on architectural risk management in distributed systems, where the added complexity must be weighed against the benefits. Specifically, this systemic risk is validated by studies on banking migration (e.g., Megargel et al., 2020), which reported that a high percentage of production problems are often traced back to improper changes within these complex systems, confirming that governance difficulty is a core operational risk. Therefore, strategies like investment in DevOps maturity are not merely best practices, but a direct and necessary attempt to mitigate this low PEOU and the associated systemic risk.

The adoption of MSA fundamentally replaces the complexity inherent in a single, large code base with complexity in distribution and operations, resulting in a direct decrease in the PEOU of the new system. Interview feedback confirmed that this transition introduces a severe overhead, with P1 noting the risk of increased data dependencies, governance concerns, and cross-team isolation issues. This complexity manifests as the risk of service proliferation (P2), where redundant or obsolete services destabilize the system, demanding advanced tooling, skilled personnel, and continuous evaluation (P2, P7). Successfully managing this requires significant upfront effort in planning and defining correct service boundaries to avoid rushing the transition (P4, P5).

### *Grounding in Technology Acceptance (TAM) Literature: The Role of PEOU*

The surge in complexity and governance directly erodes the PEOU of MSA. While agility and speed enhance PU, the managerial and technical effort required to maintain distributed systems introduces significant friction that lowers PEOU (Kakar et al., 2023). This complexity is not limited to the technical domain; it extends to the organizational layer, involving substantial coordination overhead among autonomous teams (Srinivasan & Gopalan, 2022).

P2's insight regarding "microservices proliferation" and the necessity of maintaining service inventories reflects the literature's observation that without disciplined governance, microservices environments become increasingly difficult to debug, monitor, and sustain (see M. Ahmed et al., 2021). The transition from a single point of failure to hundreds of distributed components requires substantial investment in monitoring frameworks, orchestration platforms, and DevOps maturity (Alfakih et al., 2024).

From a TAM perspective, these governance challenges reduce PEOU because they raise the perceived complexity of implementation and maintenance, especially in highly regulated banking ecosystems. Studies have shown that the perceived technical manageability of new digital systems directly influences user confidence and readiness for adoption (H. Rahman et al., 2022). Thus, the findings reinforce that while PU motivates the shift toward MSA, sustained adoption is contingent upon improving PEOU through standardization, automation, and effective governance mechanisms.

### *Extending Management Literature: Architectural Risk Management*

The complexity challenge aligns with the management literature on organizational design and operational overhead in distributed systems. Research has confirmed that the "related running and managerial costs" of MSA are often underestimated, with primary increases in areas like tooling, governance, and cross-functional work (Ortiz & González, 2025). This architectural shift necessitates a corresponding organizational shift, compelling the adoption of practices such as domain-driven design (DDD) to clearly define service boundaries and prevent overlapping functionalities (ITC Group, 2025). Failure to align the organizational structure and tooling with the distributed architecture inevitably leads to higher operational overhead, validating the participant-reported issues of poor observability and resource allocation complexity (Willard & Hutson, 2025).

### **Subtheme 2.2: Security and Compliance**

The analysis revealed that within the regulated banking sector, security and compliance operate as a non-negotiable external veto point that can override purely technological motivations, such as PU and PEOU. P1 emphasized, “If we cannot prove the chain of custody for data or meet a regulatory audit standard, the project stops,” underscoring that compliance functions as an ultimate external variable and project gate. This observation aligns with institutional theory in IT adoption, which asserts that organizational decisions are often shaped by external institutional forces—particularly government and regulatory mandates—that supersede technical or economic rationality (H. T. Nguyen & Kim, 2023).

Recent extensions of adoption frameworks confirm that stringent regulatory environments impose mandatory preconditions for technological adoption, particularly in financial institutions, where compliance is a prerequisite for implementation (V. Patel et al., 2024). Consequently, in banking, security, and compliance are not merely contextual variables but foundational prerequisites that cannot be implemented without consideration. P3 described a practical mitigation approach—the rapid start strategy—which establishes secure interfaces that wrap legacy components, allowing for parallel operation and side-by-side testing. This method supports security assurance while minimizing disruption during phased migration (H. Rahman et al., 2022).

The subtheme of security and compliance thus emerges as a non-negotiable determinant that supersedes both PU and PEOU in the regulated context. Participants repeatedly stressed that inadequate control or governance within distributed systems introduces serious vulnerabilities such as data leakage, loss of traceability, and conflicts of interest, each of which is unacceptable in financial ecosystems (Alfakih et al., 2024). P1 further noted that the growing use of autonomous, AI-driven decision-making amplifies accountability, explainability, and auditability requirements—core compliance mandates under emerging regulatory frameworks (Zhou & Wang, 2023).

***Grounding in Technology Acceptance (TAM) Literature: The External Veto Point***

In banking, security and compliance directly translate into high perceived risk, a critical inhibitor of behavioral intention (BI) within TAM-based adoption models. Unlike other sectors where performance outcomes dominate adoption behavior, financial institutions frequently experience halted adoption when non-compliance or security

breaches are possible (R. Gupta et al., 2021). P3's implementation of the rapid start strategy exemplifies how risk-mitigation mechanisms can reduce perceived risk by validating secure components before complete system replacement.

This risk-averse orientation is justified by the complexities inherent in maintaining distributed architectures, where patching and version control must occur across numerous services simultaneously (Kakar et al., 2023). Delays or inconsistencies in these updates can expand vulnerability windows and heighten exposure to cyber and compliance risks. These findings extend TAM by illustrating how, in regulated environments, perceived risk—derived from security and compliance uncertainty—serves as a dominant external veto variable that constrains both PU and PEOU.

### *Extending Management Literature: Institutional Theory*

The participant's evidence aligned with the strategic and regulatory pressures for zero-trust security models. MSA necessitates a defense-in-depth strategy, shifting security from the perimeter to the service level, often achieved through DevSecOps pipelines and service mesh technologies, which enforce mutual TLS (mTLS) for encrypted inter-service communication (Veritis, 2025). This distributed security posture directly addresses the issue of security patching complexity (P4). Furthermore, the regulatory landscape is growing more complex, with new mandates emerging related to AI governance and financial crime (Protiviti, 2025). These pressures confirmed that a successful MSA strategy must position the architecture not just for agility, but for enhanced risk management capabilities, especially around the core non-functional requirements of resilience and auditability (Wolters Kluwer, 2025).

**Subtheme 2.3: Data Ownership**

The risk associated with data ownership complexity poses a significant threat to the PU of MSA by undermining system reliability. This challenge is evident in P3's feedback concerning data ownership issues, specifically the difficulty of ensuring consistency across many independently managed service databases, which creates the potential for conflicting data across different services. If the data are unreliable, the system fundamentally fails to deliver its core value. This point contributes directly to the literature on distributed data governance, highlighting a conflict between the MSA architectural principle of decentralized data management and the stringent regulatory need for centralized data accountability in banking. Furthermore, the distributed data ownership intensifies maintenance efforts. P4 pointed out that a centralized security fix (e.g., updating a package) in a monolith is straightforward. However, in an MSA, the change must be replicated across multiple services, thereby increasing the effort and complexity of security patching. As Vargo and Lusch (2014) emphasized, data are a strategic asset. If the complexity of data ownership within a microservices environment compromises the reliability of this asset, the overall PU of the architecture is inevitably undermined.

The challenge of data ownership arises from the core MSA architectural principle of decentralized data management, which conflicts with the organizational and regulatory need for centralized data accountability and consistency. P3 explicitly noted that while true microservices require strict data ownership for each service, many real-world use cases necessitate data aggregation across multiple services, which introduces complexity

and performance inefficiencies. The architectural decision-making, therefore, involves defining clear data contracts and storage solutions (P6).

***Grounding in Technology Acceptance (TAM) Literature: Threat to PU***

The strict data ownership rule, while boosting the PU of a service through autonomy, severely complicates its PEOU. The inability to perform simple, centralized data queries or ACID transactions across services introduces significant engineering difficulty. This difficulty necessitates complex workarounds, such as using the API composition pattern (Microservices.io, 2025) or relying on eventual consistency. The PEOU is lowered because developers and architects must apply sophisticated distributed data patterns, such as Saga and CQRS, which are notoriously difficult to implement and debug compared to standard monolithic database operations (Fermion Infotech, 2025).

***Extending Management Literature: Distributed Data Governance***

The findings strongly support the academic consensus that the core technical challenge of MSA is maintaining data consistency across autonomous services without using distributed transactions. The literature has confirmed that the "database per service" pattern is critical for loose coupling but "makes transaction management and querying challenging" (Eventuate, 2025). This forces architects to implement patterns such as Saga or event sourcing, combined with CQRS, to ensure data integrity in asynchronous, eventually consistent environments (Fermion Infotech, 2025). The need for P6's concern for clear data contracts is directly linked to the requirement that the data owned by each microservice is private and accessed only through its API, ensuring independent evolution (Microsoft Learn, 2022).

**Theme 3: Organizational Readiness**

The theme of organizational readiness is paramount as it focuses on the internal capabilities and preconditions necessary for the successful adoption of microservices. In the context of the TAM, these subthemes act as crucial facilitating conditions that influence both PEOU and the successful realization of PU. The theme of organizational readiness is identified as a vital set of enabling conditions that determine the probability of success for MSA adoption, ultimately addressing whether the organization is capable of supporting the high complexity and necessary cultural change. Participants universally emphasized that the most significant challenges and successes were not technical but organizational. This theme is defined by the need for leadership support to secure resources and sustain effort, a profound cultural shift to align human structures with the distributed architecture, and the mandatory adoption of DevOps maturity to manage technical complexity. The findings confirm that technical adoption is inseparable from organizational transformation, validating the holistic, socio-technical view of successful IT change (Probojakti et al., 2025).

***Conceptual Foundation (TAM)***

The theme of organizational readiness empirically highlights the importance of external variables, or contextual factors, within the TAM. These variables, including leadership support, DevOps maturity, and cultural shift, serve as essential facilitating conditions that shape the likelihood of successful MSA adoption in the banking sector. Prior research has confirmed that contextual readiness factors enhance the explanatory

power of TAM by linking technical perceptions to organizational enablers (V. Patel & Dey, 2024).

Leadership support provides the strategic clarity, governance, and resource commitment necessary to influence both PU—by aligning architectural goals with business priorities—and behavioral intention (BI)—by signaling executive commitment to transformation (L. Zhang & Mahmood, 2023). When senior leaders articulate a unified digital vision, employees perceive microservice adoption as integral to strategic growth rather than as a technical experiment (H. Rahman & Hossain, 2024).

Similarly, DevOps maturity and a positive cultural shift directly enhance PEOU by embedding automation, collaboration, and continuous delivery practices that reduce deployment friction (D. T. Nguyen et al., 2022). Mature DevOps environments create psychological safety for experimentation and iterative improvement, thereby increasing confidence in using distributed systems (S. Ali & Khan, 2023). In contrast, without these readiness conditions, the inherent complexity and governance overhead of MSA can overwhelm perceived benefits such as agility and scalability, leading to adoption fatigue or initiative failure.

Consequently, the organizational readiness construct in this study extends TAM by integrating systemic and cultural enablers that mediate the relationship between technological perception and actual use. This reinforces that technology adoption in regulated, high-risk sectors, such as banking, is not determined solely by system attributes, but rather by the institution's readiness to absorb change (Favero et al., 2025).

**Subtheme 3.1: Leadership Support**

The theme of organizational readiness is intrinsically linked to the facilitating conditions construct of the TAM, illustrating that leadership support serves as the primary organizational prerequisite for successful MSA adoption. P5 emphasized the necessity of "top management buy-in" and "leadership providing air cover" for long, high-risk transformation projects. This empirically validates the connection between leadership commitment and technology readiness, as sustained executive backing ensures the allocation of critical resources, organizational patience for iterative development, and tolerance for uncertainty—all of which are essential when the PEOU of the new architecture is initially low and implementation costs are high.

This finding corroborates prior research that demonstrates the pivotal role of transformational leadership in digital transformation initiatives, particularly in the banking sector. Leaders must not only champion technological change but also cultivate a shared vision that aligns with institutional strategy, thereby enhancing employee confidence and readiness (L. Zhang & Mahmood, 2023). Strong leadership commitment fosters organizational resilience and reduces resistance to change by linking technological innovation to business outcomes (H. Rahman & Hossain, 2024).

Leadership Support thus emerges as the core facilitating condition enabling MSA adoption. Participants (P7, P1) highlighted the necessity of strong sponsorship and organizational patience, emphasizing that transformation entails significant cost, operational overhead, and complexity that require continuous leadership engagement. P5 reiterated that senior management buy-in ensures alignment of technology efforts with

business priorities and customer-centric objectives, reframing architectural modernization as an investment in future scalability and flexibility rather than a short-term expense. P1 added that leadership must assume shared accountability for risk mitigation and maintain consistent governance to sustain progress amid cost pressures.

Effective leadership also plays a structural role. P3 underscored the importance of aligning organizational communication structures with system design principles, referencing Conway's law to highlight that leadership must guide boundary definitions and minimize team conflicts. These perspectives reinforce that leadership must act as both the strategic sponsor and cultural architect of digital transformation, ensuring governance maturity and sustained clarity of purpose (D. T. Nguyen et al., 2022).

### *Grounding in Technology Acceptance (TAM) Literature: Facilitating Condition*

In the context of the TAM, leadership is a critical facilitating condition. It ensures the availability of organizational resources, time, and the necessary risk tolerance required to overcome the low PEOU inherent in the complex transition (Venkatesh et al., 2003). The sustained commitment signals the strategic importance of the architecture to the organization, which indirectly reinforces the high PU of the initiative and motivates continued effort. Within the TAM framework, leadership support is a primary external variable (facilitating condition) that positively moderates the relationship between BI and other variables. By providing strategic direction (P2) and committing resources over the long term (P7), leadership reduces the organizational perceived risk associated with the complexity and cost (P1). The alignment of the architecture with long-term business value (P5) also enhances the perception of PU. Furthermore, the willingness of leaders to

address organizational friction, such as by redesigning teams to align with Conway's law (P3), significantly improves PEOU by making the complex organizational adoption process appear more manageable.

### *Extending Management Literature: Strategic Alignment and Transformational Leadership*

This finding strongly validates the literature on IT-business strategic alignment (Luftman, 2003). Leadership's responsibility extends beyond funding to ensuring the MSA strategy is congruent with the overall business vision (P5, P2). This insight positions leadership's involvement as a strategic resource that drives the business transformation by prioritizing long-term market competitiveness (agility and scalability) over short-term financial constraints (P1, P7). The commitment shown reflects an aspect of transformational leadership, which is crucial for sustained success in large-scale digital transformations (Probojakti et al., 2025). The findings are highly consistent with the literature on IT-business strategic alignment. Research has confirmed that technology initiatives succeed when they are articulated in terms of business value and strategic outcomes (Hoblos et al., 2024), validating the participant’s finding that architectural work must be framed around future flexibility and scalability (P5). The necessity of addressing Conway's Law problem (P3)—ensuring that the organization's structure aligns with the new distributed system—is a central challenge in organizational design literature, which argues that a lack of organizational alignment will neutralize the benefits of a modular architecture (Cui, 2024).

**Subtheme 3.2: DevOps Maturity**

The need for DevOps maturity within the theme of organizational readiness functions as a critical facilitating condition that directly increases the PEOU and overall technological capability for MSA adoption. This is supported by P7's emphasis on mandatory technical practices, including CI/CD, automation, and continuous monitoring. These practices are essential preconditions because they directly make the otherwise complex task of managing hundreds of microservices manageable, repeatable, and less error-prone, thereby mitigating the risk associated with low PEOU. This aligns with the literature on technological capability or dynamic capability, which holds that MSA, with its requirement for independent deployment, can only function effectively if the organization has achieved sufficient DevOps maturity. Academic reports explicitly validate this mutual relationship, demonstrating that while microservices enable effective DevOps, they also simultaneously require a strong underlying DevOps capability to succeed (Jamshidi et al., 2021). High DevOps maturity is a nonnegotiable prerequisite (P7) needed to manage the complexity of hundreds of services (P4, P6). This maturity is defined by full automation across the pipeline, including the use of Infrastructure as Code (IaC) (P1), continuous delivery, and comprehensive service monitoring (P5). The most effective organizational model, supported by the data, is to embed DevOps responsibilities within small, autonomous service teams (P3), which promotes accountability and aligns with the decentralized architecture, thereby counteracting the monolithic behavior that centralized DevOps teams can create (P3). A key challenge is the organizational confusion surrounding roles (DevOps, SRE, DevSecOps) and the

constraints imposed by stringent banking regulations, which limit public cloud adoption and slow the integration of security into the pipelines (P2).

DevOps Maturity is identified as a mandatory technological capability prerequisite for Microservice adoption, which is essential for managing high operational complexity. P7 pointed out that the additional overhead necessitates higher tooling, maintenance, and coordination demands. P2 emphasized the importance of clear, well-defined plans and goals that break down high-level business objectives into concrete, manageable technology deliverables. P3 noted the need for effective governance frameworks to coordinate parallel teams and manage dependencies, and P6 emphasized the importance of timely design review and decision-making to reduce delays and maintain momentum.

***Grounding in Technology Acceptance (TAM) Literature: Attitude Toward Use***

DevOps maturity functions as a crucial facilitating condition within the TAM, directly enhancing the PEOU of MSA. Without automation, managing the orchestration, deployment, and continuous testing of numerous distributed services becomes a labor-intensive and error-prone activity, significantly diminishing PEOU (S. Ahmed & Waseem, 2023). P4 and P7 emphasized that manual deployment processes and limited observability create operational bottlenecks that increase both perceived effort and cognitive load.

In contrast, Infrastructure as Code (IaC) and pipeline automation (P1, P5) elevate usability perceptions by simplifying operations and standardizing workflows. These automated mechanisms reduce human error, accelerate feedback loops, and lower the

perceived risk of production failures, thereby improving overall confidence in system stability (Vasquez et al., 2022). From a TAM standpoint, automation translates into greater system controllability, enhancing both PEOU and positive attitude toward use (ATU) (Tan & Lim, 2024).

However, organizational factors such as unclear roles, misaligned responsibilities, and fragmented communication structures (P2) remain significant inhibitors of PEOU. Such governance issues increase the perceived effort required to manage cross-functional collaboration and limit the psychological comfort associated with system usability (H. Rahman et al., 2021). Therefore, high DevOps maturity—characterized by cultural cohesion, automation, and role clarity—acts as a decisive factor in shaping a positive Attitude toward Use and facilitating successful adoption of MSA in banking institutions.

***Extending Management Literature: Socio-Technical Systems and Conway's Law***

This finding provides strong empirical validation of the socio-technical systems (STS) view, which dictates that technical architecture must be accompanied by congruent organizational and human changes (Tanveer et al., 2023). The emphasis on resolving Conway's law issues (P3) is paramount; distributed software (MSA) requires congruent, distributed, autonomous human structures to manage it effectively. By fostering an agile, adaptable culture, the organization reduces internal friction and enhances its ability to act quickly, thereby operationalizing the full operational agility promised by the architecture (Probojakti et al., 2025).

These findings reinforce the literature on continuous delivery (CD) and operational excellence (OpEx), which views high automation as a strategic imperative for

high-velocity organizations (Forsgren et al., 2018). DevOps maturity is the strategic response to the principle that complexity must be managed through automation, not manual processes (P4). Furthermore, the preference for embedded DevOps and service ownership (P3) strongly supports the principles of site reliability engineering (SRE), where development teams take operational ownership to improve service quality and accelerate innovation (Panda et al., 2025).

**Subtheme 3.3: Cultural Shift**

The need for a cultural shift within the organizational readiness theme serves as a vital facilitating condition that shapes employees' Attitudes toward using the new MSA. P3 highlighted this profound requirement by emphasizing the necessity for teams to adopt a "you build it, you run it" model, which signifies a shift toward end-to-end ownership and a clear departure from siloed development and operations teams. This cultural realignment must be congruent with the technical architecture to foster a positive disposition toward the new working model. This finding directly supports the socio-technical systems (STS) view, which recognizes that corresponding organizational and human changes must accompany the technical adoption of MSA. Research has confirmed that fostering an agile, adaptable, and innovation-focused culture is essential for employees to reduce resistance and fully embrace the digital change inherent in MSA, a factor that is particularly critical within the banking sector (P. Haindl et al., 2024; Usman et al., 2025).

The cultural shift acts as a crucial facilitating condition that directly shapes employees' attitudes toward using the new architecture. By moving from a monolithic,

siloed structure to a distributed, autonomous team model, the organization signals trust and ownership. This creates a positive attitude toward the new working model, making it a viable condition for adoption (Venkatesh et al., 2003). A failure to address the culture—maintaining monolithic behavior (P3)—leads to organizational friction, effectively undermining the benefits of the technology regardless of its high PU. The cultural dimension is deemed more foundational than technology (P4). The core change is the shift from a traditional, siloed, hand-off culture (e.g., Dev to QA to Ops) (P2) to a new culture of complete, end-to-end service ownership (P1, P2) based on the principle of "you build it, you run it." This requires a profound mindset change from a "delivery" mentality to an "ownership and product" mentality (P5) within small, autonomous, cross-functional teams (P3). Participants provided strong evidence that failure to make this organizational shift—a classic misalignment with Conway's law—results in a costly, fragile "distributed monolith" (P7), where the architectural benefits are never realized.

### *Grounding in Technology Acceptance (TAM) Literature: The Role of PEOU and Facilitating Conditions*

DevOps practices (CI/CD, automation, monitoring) function as the essential technical facilitating conditions that directly increase the PEOU of the complex MSA (Venkatesh et al., 2003). The adoption of an advanced toolchain and automation makes the complex tasks of deployment, monitoring, and tracing manageable, repeatable, and less prone to errors, which is a necessary countermeasure to the inherent complexity of distribution. Without this technological maturity, the system would be deemed too difficult to use and maintain, thereby compromising its eventual adoption and success.

The cultural shift is a powerful external variable that preconditions the entire adoption process. A successful cultural shift is a facilitating condition that enables a high PEOU, as it empowers autonomous teams to resolve issues quickly and reduces bureaucratic friction (P2, P3). Conversely, cultural resistance and a siloed mindset act as a negative moderator, transforming the complexity of MSA into an inhibitor that effectively lowers PEOU and increases perceived risk (P1, P5). The shift to an ownership/product mindset (P5) directly reinforces PU, as teams are directly accountable for the service's utility and business outcome.

***Extending Management Literature: Technological Capability and Process Maturity***

This finding aligns with the concept of technological capability or dynamic capability, confirming that the adoption of microservices is inseparable from the use of an advanced toolchain (P. Haindl et al., 2024). The architectural requirement for independent deployment necessitates that the organization has achieved sufficient DevOps maturity. Research explicitly links the two, showing that Microservices enables effective DevOps while simultaneously requiring strong DevOps maturity to succeed (P. Haindl et al., 2024). The organizational demand for timely design review and quick decision-making (P6) further highlights that the process aspect of DevOps (governance and agility) is as critical as the tooling for achieving speed and stability.

These findings provide strong empirical validation for Conway's law in the banking context (P3, P7), confirming the literature's assertion that architecture and organizational structure are deeply interconnected (Cui, 2024). The necessity of establishing autonomous, cross-functional teams (P3, P4) is a core element of STS

theory, which emphasizes that optimizing technology (MSA) requires the co-optimization of the social structure (the teams) to achieve maximum performance. The shift to a product mindset (P5) also aligns with contemporary management thought, which advocates for organizing teams around long-lived business capabilities rather than temporary projects (Ahsan, 2025).

**Theme 4: Implementation Strategies**

Implementation Strategies are critical for operationalizing the adoption of MSA and directly linking organizational readiness with PU. These strategies outline how institutions practically implement architectural transformation, manage risks, and ensure that theoretical benefits—such as agility and scalability—translate into tangible performance outcomes. Within the TAM, these strategies serve as mechanisms that enhance PEOU by reducing the perceived complexity and operational risk associated with adopting MSA (Kakar et al., 2023).

The findings confirmed that successful implementation relies on pragmatic, process-driven approaches rather than rigid technical blueprints. Specifically, organizations employ incremental migration, a strategy that mitigates risk by decomposing legacy systems gradually while maintaining business continuity (Suryawanshi & Tiwari, 2022). This phased approach allows continuous validation of new services, ensuring alignment between perceived utility and practical feasibility. Equally essential is the leveraging of modern tools and technology stacks, including automated CI/CD pipelines, container orchestration platforms, and service meshes. These instruments enhance PEOU by simplifying service deployment and governance while

simultaneously reinforcing PU through improved reliability and scalability (Zhu et al., 2024).

Furthermore, team autonomy—established through clear ownership and DevOps enablement—emerges as a decisive factor in ensuring smoother adoption. By aligning accountability with service boundaries, organizations minimize communication friction and increase operational agility (Fernandes et al., 2021). This structural alignment mirrors TAM's assertion that reducing effort expectancy (PEOU) enhances positive user attitudes toward technology.

Ultimately, the careful selection and execution of implementation strategies serve as the actionable roadmap that bridges the gap between readiness and outcomes. These strategies serve as the enabling mechanisms through which leadership vision, organizational preparedness, and system capability converge to realize the PU of MSA, thereby validating the TAM framework in complex, regulated environments such as banking.

**Subtheme 4.1: Incremental Migration (Strangler Fig Pattern)**

The analysis of implementation strategies reveals that the approach to adoption is primarily governed by the need to mitigate risk and manage PEOU. P5's feedback—highlighting a preference for a controlled, piece-by-piece migration (e.g., the Strangler Fig Pattern) over a "big bang" approach—confirms this strategic choice to proactively mitigate systemic risk (a significant Barrier) and manage technical complexity (low PEOU). This slow, deliberate methodology is highly favored in the regulated banking sector. This finding strongly reinforces the literature on architectural refactoring

strategies, where recent studies emphasize that in large, complex enterprise systems, a "Strangler Fig" approach is a necessity, not merely a choice, to ensure crucial business continuity and reduce the risk of catastrophic failure during the transition. For banking specifically, this incremental strategy is vital because it ensures that migration activities remain testable, reversible, and compliant, all of which are non-negotiable preconditions (Megargel et al., 2020; Saghafian et al., 2021).

Incremental migration is identified as the foundational strategic approach, explicitly prioritized for its ability to mitigate risk and operational disruption in the banking sector. P5 detailed the necessity of gradual rollout strategies, such as building new features as microservices, carving out parts of the monolith (similar to the Strangler Fig Pattern), and utilizing shadow traffic to run new services in parallel with legacy systems for comparison and evaluation. P3 and P5 emphasized that phased, carefully managed migration using techniques like feature toggles allows for controlled cutovers and helps detect issues early, replacing the risky "big-bang" switch. P6 confirmed this phased progression, noting the evolution from containerization to serverless architectures to reduce maintenance overhead.

***Grounding in Technology Acceptance (TAM) Literature: The Role of PEOU***

The empirical data strongly support that incremental migration functions directly to increase the PEOU of MSA. A phased approach reduces the sheer complexity and risk of the transformation, making the adoption process appear more manageable (Venkatesh et al., 2003). By utilizing techniques such as shadow traffic and feature toggles, IT leaders can reduce the perceived effort and operational risk associated with deploying

new technology, thereby maintaining a higher PEOU compared to a complete, high-risk, immediate replacement.

***Extending Management Literature: Architectural Risk Management***

This finding contributes directly to the literature on architectural risk management and change management. The preference for gradual techniques, such as the strangler fig pattern (P5), is validated by contemporary systematic reviews of migration strategies, which find that risk mitigation is paramount (Trabelsi et al., 2025). Furthermore, this strategic choice, which prioritizes non-disruptive migration and business continuity, aligns with recent research that formalizes the principles and practices of incremental modernization (Pittu, 2025).

**Subtheme 4.2: Tools and Technology**

The selection of tools and technology as an implementation strategy is a critical factor that directly enables the PEOU of MSA. P4's focus on tools for automation, observability, and containerization (such as Kubernetes and Docker) is the practical realization of DevOps maturity. These tools function as essential facilitating conditions that raise the PEOU by automating complex tasks, such as deployment, monitoring, and tracing, within a distributed environment. This finding supports the established concept of technological infrastructure as a critical success factor, as research consistently demonstrates that the adoption of microservices is inseparable from the use of an advanced toolchain, including container orchestration and CI/CD. Without these essential tools, the complexity of microservices management increases exponentially, confirming

that the technology stack is a prerequisite for achieving the promised agility (Megargel et al., 2020; Saghafian et al., 2021).

The effective adoption of MSA relies on modern, robust tools and a technology stack, which serves as a concrete facilitating condition for managing operational complexity. Participants confirmed the necessity of a cloud-native toolchain, including containerization (Docker) and orchestration platforms like Google Kubernetes Engine (GKE) (P3, P4). This infrastructure is complemented by Infrastructure as Code (IaC) tools, such as Terraform, and Continuous Integration/Continuous Delivery (CI/CD) pipelines utilizing tools like GitHub Actions and Jenkins (P4, P7). P7 also highlighted the diversity in programming languages, with Java/Spring Boot, Go, and Python/FastAPI being common choices, selected based on specific use cases and team expertise (P1).

***Grounding in Technology Acceptance (TAM) Literature: Facilitating Condition***

Tools and technology are the foundational technical facilitating conditions that directly increase the PEOU of the highly complex MSA. The advanced toolchain enables automation for deployment, monitoring, and tracing, making the intricate task of managing hundreds of distributed services more manageable and less prone to errors (Venkatesh et al., 2003). Without these tools, the complexity overhead would be too high, resulting in an unacceptably low PEOU.

***Extending Management Literature: Technological Capability and Cloud-Native Development***

This finding strongly aligns with the current literature on technological capability and the requirement for a cloud-native environment. Research has emphasized that MSA

adoption is a "journey to cloud native" that is inseparable from the use of modern platforms and services (Jamshidi et al., 2021). The comprehensive use of tooling is essential for resilience, observability, and managing the distributed nature of the system, confirming the modern approach to cloud-native development where the toolchain is a prerequisite for system functionality (Agrawal, 2025).

**Subtheme 4.3: Team Autonomy**

The implementation strategy of granting team autonomy is critical because it ensures organizational congruence with architecture. P3's feedback on giving teams full lifecycle ownership and decentralized decision-making power (such as choosing their own technology stack) is the operationalization of the necessary cultural shift. The MSA needs to function correctly. This finding provides empirical validation of Conway's law, which posits that the system architecture mirrors the organizational structure. Modern literature on microservices highlights that architecture and organization must be congruent; distributed services inherently require distributed, autonomous teams to manage them effectively. By granting autonomy, the strategy serves as a facilitating condition that enhances the team's ability to act quickly and independently, thereby enabling and realizing the potential for agility throughout the entire organization (Usman et al., 2025).

Team autonomy is a critical, structural implementation strategy that ensures the organizational structure is congruent with the architecture, maximizing speed and accountability. P6 explicitly stated that teams are given the flexibility to design components independently once service boundaries are identified, owning the design

decisions for their specific business logic. This decentralization requires aligning services around reusable, well-defined business domains (P2), a principle rooted in Domain-Driven Design (DDD) (P7). P4 noted that this approach creates services with clear boundaries and ownership (complete functional modules), which is crucial for manageability.

***Grounding in Technology Acceptance (TAM) Literature: Maximizing PU***

While this theme serves as a facilitating condition, its primary impact is to maximize PU. By aligning services with clear business domains (P2), the system's output is optimized for strategic utility and business value, which directly contributes to its PU (Venkatesh et al., 2003). Team autonomy also enhances PEOU by minimizing cross-team dependencies and delays (P6), allowing teams to move faster and reducing organizational friction associated with complex coordination.

***Extending Management Literature: Socio-Technical Systems and Domain-Driven Design***

This finding provides crucial empirical evidence for the STS view and Conway's law in contemporary software architecture. The adoption of MSA necessitates that the organization's structure mirrors the software design, and recent systematic reviews confirm the efficacy of DDD in bridging the gap between technical and business domains to achieve this required alignment (Özkan et al., 2025). This strategy ensures that technical service boundaries align with business capabilities, which is a key pattern for achieving cohesion and autonomy in enterprise-scale microservices (Kumar, 2025).

**Theme 5: Perceived Outcomes**

The theme perceived outcomes represents the culmination of the adoption process, highlighting the realized benefits that validate the decision to transition from monolithic systems to MSA. Within the TAM, these outcomes are the manifestation of PU—the degree to which adopters believe the technology enhances organizational performance and aligns with strategic objectives (Vasudevan et al., 2023). The empirical findings reveal that MSA adoption delivers tangible improvements in operational agility, system resilience, and innovation capability, each reinforcing the PU construct. Participants consistently emphasized that faster deployment cycles, scalability, and improved fault isolation directly enhanced the institution's responsiveness to regulatory changes and market dynamics (P1, P3, P5). These observations align with the existing literature, which suggests that microservices enhance business agility by enabling modular, independent updates to services and facilitating continuous delivery (Alfakih et al., 2024).

Furthermore, the realization of system resilience was identified as a critical validation of PU. MSA enables localized fault tolerance and system elasticity, which collectively reduce downtime and operational risks (L. Chen & Zhao, 2022). For regulated sectors such as banking, where service continuity and data integrity are paramount, these performance gains confirm that the adoption of MSA satisfies high-stakes functional and compliance requirements—further strengthening BI to sustain and scale adoption. Another key outcome relates to innovation capability, as decentralized architectures empower teams to experiment, deploy, and iterate more freely without

endangering core systems. This autonomy accelerates time-to-market for new financial products and services, thereby enhancing the institution's competitive positioning (Santos et al., 2021). From a TAM lens, this reinforces the feedback loop where realized usefulness positively influences future adoption intentions.

In sum, perceived outcomes confirm that when Implementation Strategies (such as incremental migration and tool stack automation) and organizational readiness (leadership support and DevOps maturity) are effectively integrated, they yield measurable business benefits. These outcomes—expressed through agility, resilience, and innovation—serve as the empirical validation of PU, confirming that MSA adoption in banking is not merely technological, but strategically transformative.

**Subtheme 5.1: Improved Performance**

The findings for perceived outcomes confirm the direct relationship between realization of PU and MSA, demonstrating that MSA delivers tangible improvements in system quality. This is powerfully articulated in P1's feedback concerning improved performance and resilience, noting increased system stability, horizontal scaling, and, critically, fault isolation, stating, "one service failure no longer takes down the entire application." This represents the purest form of realized PU: the technology is valued because it fundamentally enhances the system's performance characteristics. This empirical outcome aligns precisely with the core academic justification for MSA adoption, which focuses on improving system quality attributes. Recent literature, particularly in cloud environments, consistently validates that microservices are explicitly adopted to build scalable, resilient, and highly available applications, confirming that

these technical benefits are the primary and expected tangible outputs for IT leaders (Ramu, 2023).

Incremental migration is identified as the foundational strategic approach, explicitly prioritized for its ability to mitigate risk and operational disruption in the banking sector. P5 detailed the necessity of gradual rollout strategies, such as building new features as microservices, carving out parts of the monolith (similar to the Strangler Fig Pattern), and utilizing shadow traffic to run new services in parallel with legacy systems for comparison and evaluation. P3 and P5 emphasized that phased, carefully managed migration using techniques like feature toggles allows for controlled cutovers and helps detect issues early, replacing the risky "big-bang" switch. P6 confirmed this phased progression, noting the evolution from containerization to serverless architectures to reduce maintenance overhead.

***Grounding in Technology Acceptance (TAM) Literature: The Role of PEOU***

The empirical data strongly support that incremental migration functions directly to increase the PEOU of MSA. A phased approach reduces the sheer complexity and risk of the transformation, making the adoption process appear more manageable (Venkatesh et al., 2003). By utilizing techniques such as shadow traffic and feature toggles, IT leaders can reduce the perceived effort and operational risk associated with deploying new technology, thereby maintaining a higher PEOU compared to a complete, high-risk, immediate replacement.

### *Extending Management Literature: Architectural Risk Management*

This finding contributes directly to the literature on architectural risk management and change management. The preference for gradual techniques, such as the strangler fig pattern (P5), is validated by contemporary systematic reviews of migration strategies, which find that risk mitigation is paramount (Trabelsi et al., 2025). Furthermore, this strategic choice, which prioritizes non-disruptive migration and business continuity, aligns with recent research that formalizes the principles and practices of incremental modernization (Pittu, 2025).

### Subtheme 5.2: Business Alignment

The theme of perceived outcomes confirms the direct realization of PU for the banking organization, particularly in achieving business agility. P2's feedback on realizing faster release cycles, independent deployments, and quicker feature development serves to validate the core theme of business needs, especially where "time-to-market is the biggest driver." This strategic benefit represents the crucial economic value realized by adopting MSA. This empirical result supports the literature on continuous delivery and business agility, where studies consistently show that the decoupled nature of microservices, when combined with a high level of DevOps maturity (which acts as a key facilitating condition), dramatically reduces the lead time for changes. This capability enables rapid adaptation to market demands, which is essential for maintaining a competitive edge in the financial sector (Jamshidi et al., 2021; Ramu, 2023).

The effective adoption of MSA relies on modern, robust tools and technology stack, which serves as a concrete facilitating condition for managing operational complexity. Participants confirmed the necessity of a cloud-native toolchain, including containerization (Docker) and orchestration platforms like Google Kubernetes Engine (GKE) (P3, P4). IaC complements this infrastructure)tools, such as Terraform, and CI/CD pipelines utilizing tools like GitHub Actions and Jenkins (P4, P7). P7 also highlighted the diversity in programming languages, with Java/Spring Boot, Go, and Python/FastAPI being common choices, selected based on specific use cases and team expertise (P1).

***Grounding in Technology Acceptance (TAM) Literature: Facilitating Condition***

Tools and technology are the foundational technical facilitating conditions that directly increase the PEOU of the highly complex MSA. The advanced toolchain enables automation for deployment, monitoring, and tracing, making the intricate task of managing hundreds of distributed services more manageable and less prone to errors (Venkatesh et al., 2003). Without these tools, the complexity overhead would be too high, resulting in an unacceptably low PEOU.

***Extending Management Literature: Technological Capability and Cloud-Native Development***

This finding strongly aligns with the current literature on technological capability and the requirement for a cloud-native environment. Research has emphasized that MSA adoption is a "journey to cloud native" that is inseparable from the use of modern platforms and services (Jamshidi et al., 2021). The comprehensive use of tooling is

essential for resilience, observability, and managing the distributed nature of the system, confirming the modern approach to cloud-native development where the toolchain is a prerequisite for system functionality (Agrawal, 2025).

**Subtheme 5.3: Operational Agility**

The study's theme of perceived outcomes reveals the successful realization of strategic alignment following the adoption of MSA. P2's feedback confirmed that the new architecture now "maps directly to business domains" and allows teams to focus on "specific business capabilities," providing empirical evidence that the IT strategy is now coherent with the overall business strategy. This outcome is the result of successful strategic alignment, a key driver of adoption. Academic research emphasizes that a well-designed microservice architecture should align the technical decomposition of services with business domain boundaries (known as domain-driven design). This critical alignment facilitates organizational agility and ensures that significant IT investments directly contribute to high-level strategic goals, maximizing the value derived from the transformation (Amri et al., 2024).

Team autonomy is a critical, structural implementation strategy that ensures the organizational structure is congruent with the architecture, maximizing speed and accountability. P6 explicitly stated that teams are given the flexibility to design components independently once service boundaries are identified, owning the design decisions for their specific business logic. This decentralization requires aligning services around reusable, well-defined business domains (P2), a principle rooted in domain-driven

design (DDD) (P7). P4 noted that this approach creates services with clear boundaries and ownership (complete functional modules), which is crucial for manageability.

### *Grounding in Technology Acceptance (TAM) Literature: Maximizing PU*

While this theme serves as a facilitating condition, its primary impact is to maximize PU. By aligning services with clear business domains (P2), the system's output is optimized for strategic utility and business value, which directly contributes to its PU (Venkatesh et al., 2003). Team autonomy also enhances PEOU by minimizing cross-team dependencies and delays (P6), allowing teams to move faster and reducing organizational friction associated with complex coordination.

### *Extending Management Literature: STS and Domain-Driven Design*

This finding provides crucial empirical evidence for the STS view and Conway's law in contemporary software architecture. The adoption of MSA necessitates that the organization's structure mirrors the software design, and recent systematic reviews confirm the efficacy of DDD in bridging the gap between technical and business domains to achieve this required alignment (Özkan et al., 2025). This strategy ensures that technical service boundaries align with business capabilities, which is a key pattern for achieving cohesion and autonomy in enterprise-scale microservices (Kumar, 2025).

## Applications to Professional Practice

The qualitative findings, synthesized across the themes of adoption drivers, barriers, and risks, organizational readiness, implementation strategies, and perceived outcomes, provide concrete and actionable guidance for IT leaders—specifically,

enterprise architects, software engineering managers, and transformation leads—operating within the regulated financial services sector.

The research moves beyond general technology hype by providing a contextualized decision-making framework for MSA adoption, arguing that success is contingent upon strategic alignment, risk mitigation, and cultural enablement.

**For Strategic IT Leadership: Contextualizing Adoption**

The key takeaway for technology leaders is to prioritize business alignment over hype by shifting the focus from adopting microservices simply because of market trends ("everyone else is") to selecting it as the optimal solution for a specific strategic business need (business needs). The core objective must be to demonstrate a measurable link between the architecture's technical benefits, such as fault isolation and independent scaling, and high-level business goals, including achieving faster time-to-market and ensuring regulatory compliance.

Consequently, before initiating any migration, IT executives must articulate MSA's PU in terms of its measurable return on investment (ROI) in business agility, rather than focusing solely on internal technical metrics. Furthermore, leadership support must be secured by successfully framing MSA as a crucial risk-mitigation strategy against the inevitable failure of legacy systems and the potential for competitive obsolescence. Given the highly regulated context, professional practice must adopt a contingency approach to strategy, recognizing that the banking sector's stringent security and compliance requirements act as a non-negotiable constraint that invalidates generic "best practices." Therefore, the default architecture strategy must be one of incremental

migration, regardless of the potential for a slower pace, because this approach allows for continuous auditability and small, reversible deployments, which directly manage compliance and systemic risk. Thus, "big bang" migrations are deemed professionally irresponsible in this context.

**For Software Engineering Management: Cultivating Capabilities**

The research findings strongly underscore that the technical complexity of MSA can only be effectively managed by intentionally investing in specific, advanced organizational capabilities, primarily DevOps maturity and cultural shift. Engineering managers must thus view MSA adoption as an organizational maturity project, not just an architecture project, as the inherent complexity of a distributed system forces the development of essential capabilities that will benefit all future IT initiatives. As actionable advice, investment in tools and technology—such as Kubernetes, advanced observability platforms, and automated CI/CD pipelines—is a non-negotiable prerequisite for managing the low PEOU inherent in distributed systems.

Without achieving high DevOps maturity, the organization risks implementing only high complexity without realizing the promised benefits of operational agility. This investment is not in the architecture itself, but in the automation framework that enables it. An organizational change must mirror this technical shift, as engineering practices must reflect the principle of Conway's Law: distributed software demands a distributed human structure. Therefore, engineering leaders must foster team autonomy as a critical cultural shift by transitioning to cross-functional, domain-focused teams. These teams must be granted end-to-end ownership (DevSecOps), controlling the full lifecycle of their

services from code to production. This decentralization of governance is the only way to realize the operational agility that the architecture promises successfully.

**For Enterprise Architects: Risk-Centric Design**

This guidance provides enterprise architects with a blueprint for structuring the migration that prioritizes system stability and regulatory compliance. Architects must initially design for risk mitigation first, recognizing that MSA is successful in banking primarily because it effectively addresses two major risk factors: data ownership and cascading failure. As actionable advice, architects must design services according to DDD principles, ensuring each service owns its data store specifically to achieve transactional isolation and transparent accountability, thereby mitigating the data ownership barrier. Furthermore, the design must incorporate resilience patterns (e.g., circuit breakers) to achieve improved performance (resilience and fault isolation), treating these as mandatory security and compliance features, not optional performance enhancements.

To mitigate the systemic risk, architects must leverage the strangler fig pattern, as the incremental migration strategy is the most powerful tool for avoiding the "Big Bang" risk. This actionable advice focuses on incrementally eliminating non-core, less risky functionalities first, which preserves the stability of critical monolithic components. This strategy is essential because it allows the organization to safely gain experience, mature its DevOps practices, and build confidence before tackling high-risk, core banking systems, thereby ensuring compliance is maintained throughout the entire process.

## Implications for Social Change

This study's implications for social change are grounded in the core significance of improving digital public infrastructure and the resulting perceived outcomes of enhanced system performance and agility. The findings demonstrate that strategic IT practices in the banking sector directly translate into tangible benefits for customers, communities, and the broader financial ecosystem.

The successful adoption of MSA, as outlined in this study, leads to three primary areas of social improvement.

### Enhancing Financial Inclusion and Accessibility for Individuals and Communities

The ultimate success of implementing MSA extends beyond the organization, directly impacting the public's access to and experience with financial services through the realization of improved performance (scalability and resilience) and operational agility (time-to-market). The core technical outcomes of MSA—enhanced fault isolation and resilience—mean that essential core banking services, such as payment systems and balance inquiries, are significantly less prone to downtime and cascading failures. This translates directly into reliable access to essential services for individuals, particularly benefiting low-income or remote communities where a failed transaction can have severe consequences, thereby boosting public trust and reducing the economic cost of service disruption.

Furthermore, the outcome of faster time-to-market fosters greater financial inclusion by allowing banks to deploy new financial products—including microloans, personalized savings tools, or integrated community payment platforms—much more

quickly. This agility enables banks to respond more effectively to the unique and changing needs of diverse communities, quickly bridging service gaps and fostering greater community benefit.

**Improving Institutional Stability and Public Trust**

The strategic approach to managing barriers and risks within the MSA transformation significantly enhances the structural integrity of the entire financial system, benefiting both institutions and the broader public. By strictly adopting the incremental migration strategy and rigorously prioritizing security and compliance, banks effectively achieve increased systemic stability, mitigating the catastrophic systemic risk associated with massive core system failures. The findings demonstrate that this disciplined adoption method is crucial for maintaining compliance, which forms the foundational basis of institutional trust.

A more stable banking sector, one that is mainly free from frequent, high-profile outages or data breaches, directly reduces fear and uncertainty among the public and stakeholders. Concurrently, the required cultural shift toward team autonomy—instilling end-to-end ownership—results in fostering a culture of accountability within IT organizations. This organizational shift instills a greater sense of responsibility and facilitates faster problem resolution within the institution, making the banking institutions more transparent and responsive. This is because service failures can be quickly isolated and fixed by the small, autonomous team responsible for that specific business domain, rather than being obscured within a large, bureaucratic organization.

### Driving Innovation and Economic Competitiveness for Society

The achievements in business alignment and operational agility through MSA position financial institutions to become powerful engines of broader societal innovation. By achieving a high degree of operational agility, banks can transform themselves into better partners for FinTech companies and other external innovators. This is accomplished by exposing services through APIs that align with specific business capabilities, which significantly lowers the barrier to integrating third-party services. This capability promotes economic growth by fostering a vibrant digital ecosystem where new, value-added services can be built quickly and securely on top of a stable banking infrastructure.

Concurrently, the required investment in organizational readiness, particularly in DevOps maturity and new technical capabilities (tools and technology), drives a critical societal shift in the workforce. This shift moves the labor force away from manual, low-value maintenance tasks toward high-value work in automation, security, and innovative product development. This change creates sustained demand for highly skilled IT professionals, driving up the labor market's intellectual capital and overall economic competitiveness..

## Recommendations for Action

The recommendations flow directly from the study's conclusions, translating the strategic link between adoption drivers and realized perceived outcomes into practical action steps. They focus on establishing the necessary organizational readiness and mitigating barriers and risks to achieve improved performance and operational agility.

**Practical Action Steps**

The practical action steps for MSA implementation in the banking sector require a disciplined approach that integrates strategic business planning, risk mitigation, and mandatory capability development. A "Business Case First, Architecture Second" mandate must be established, meaning MSA should only be adopted when it provides a quantifiable competitive advantage in operational agility or improved performance that directly addresses a specific business bottleneck, rather than merely following trends. Actionable steps include mandating a calculation that quantifies Agility ROI (e.g., expected reduction in release cycle time versus the cost of complexity) and justifying the migration as a risk-mitigation strategy to prevent legacy system failure, framing resilience as a compliance necessity.

The implementation strategy must be risk-centric, adopting incremental migration as the default and only strategy to avoid the "big bang" approach that violates the stringent regulatory constraints inherent in banking. This is achieved by implementing the strangler fig pattern, which involves allocating resources to maintain the Monolith while incrementally building new, business-aligned services around it. Additionally, prioritizing compliance is ensured by integrating security checkpoints into every sprint, thereby guaranteeing that each new service is fully auditable and compliant from the outset.

Crucially, capability development must treat DevOps maturity and cultural shift as mandatory preconditions for the architecture to deliver value. Actionable steps involve investing in tooling, such as standardizing platforms for CI/CD, container orchestration

(e.g., Kubernetes), and distributed monitoring, to boost PEOU and enforce team autonomy. This requires deconstructing centralized governance and restructuring teams around business domains, granting them full end-to-end ownership over their services, which operationalizes the necessary cultural shift. Finally, architectural governance must mandate DDD to enforce organizational accountability and data integrity. This involves training architects and engineers in DDD for precise service boundary definition and strictly enforcing the rule of decentralizing data ownership, ensuring each microservice owns its own data store to achieve essential fault isolation and resolve the data ownership barrier.

**Target Audience for Results**

The results of this study hold significance for several key groups within the financial technology ecosystem:

- Executive leadership (CIOs, CTOs): They need to understand the strategic and cultural preconditions for success, recognizing that leadership support and organizational readiness are the primary determinants of ROI.
- Enterprise architects and transformation leads require a tactical blueprint—specifically, the need for incremental migration and risk-centric design—to structure the long-term roadmap.
- Software engineering managers must prioritize the need for significant investment in DevOps maturity and the transition to team autonomy to effectively manage operational complexity.

- Regulators and compliance officers: The findings on prioritizing security and compliance, as well as the effectiveness of incremental migration in maintaining control, offer insights into how institutions can adopt modern architecture while adhering to stringent regulatory standards, thereby contributing to systemic stability.

**Dissemination Methods**

The findings should be disseminated through both academic and professional channels to maximize their impact on practice:

1. Academic publications: Publish in peer-reviewed journals on Information Systems, Software Engineering, and Strategic Management (e.g., *MIS Quarterly*, *IEEE Software*, *Strategic Management Journal*) to establish scholarly credibility.
2. Industry reports and white papers: Translate the academic findings into accessible, practitioner-focused white papers and blog posts for central banking and technology consulting firms (e.g., Gartner, Forrester, thought leadership sections of large banks).
3. Professional conferences: Present the results at key industry conferences, such as the Gartner Symposium/ITxpo and the DevOps Enterprise Summit (DOES), as well as specialized FinTech forums, to directly engage the target audience of IT executives and architects.
4. Targeted workshops: Develop and conduct focused workshops for enterprise architecture and DevOps teams at major financial institutions, using the

incremental migration and organizational readiness themes as core training modules.

## Recommendations for Further Study

Further research should build on the contextualized findings of this study to address the practical implementation gaps and deepen the theoretical understanding of technology adoption in regulated, complex environments. These recommendations highlight topics that require closer examination to generate a new round of questions related to enhanced practice in information technology.

### Comparative Analysis of Adoption Strategies (Practice Focus)

This study identified incremental migration as the preferred banking strategy. Further research should quantify the trade-offs of this approach. A key area for further study involves quantifying the trade-offs between incremental migration speed and compliance risk in financial institutions. While the qualitative findings affirm that incremental migration is the prudent implementation strategy in the highly regulated banking sector, IT leaders currently lack a validated model to determine the optimal pace of this migration. This gap presents a risk, as there may be an inflection point where a slow migration pace incurs higher costs in terms of competitive latency (a loss of operational agility) than the regulatory risk it is intended to mitigate.

Therefore, future research should address the following question: What is the quantitative relationship between the rate of legacy system strangulation (e.g., number of services deployed per quarter) and realized compliance costs (e.g., audit time, security incidents) in large, regulated banks? Answering this question would provide a vital, data-

driven model for setting project timelines, directly linking the qualitative findings from the implementation strategy theme to the perceived outcomes, barriers, and risks themes, thereby significantly improving professional practice.

**Measuring the Impact of Organizational Congruence (Knowledge and Practice Focus)**

The findings focus on establishing the causal link between docio-technical congruence (team autonomy and MSA) and system resilience, given that the current findings strongly highlight the necessity of team autonomy (cultural shift) to achieve operational agility. While the study confirmed that the organizational structure should mirror the architecture (Conway's law), there is a need for a deeper, causal analysis to determine if a highly autonomous team structure actually leads to superior system quality and resilience. Specifically, researchers need to investigate how the decentralized governance that results from this necessary cultural shift affects the management of complex, cross-cutting concerns, such as data consistency and security. The critical research question is as follows: To what extent does the degree of team autonomy (measured by independent decision-making over tools, budget, and deployment) correlate with reducing severe production incidents (such as cascading failures and data inconsistency errors) in a microservice environment? The results of this quantitative research would provide strong, evidence-based guidance for Human Resources and C-suite executives on the optimal way to structure teams to maximize technical performance, thereby empirically validating the professional necessity of the cultural shift theme.

### Extending the TAM to Model Regulatory Veto Points (Knowledge Focus)

The necessity of regulatory adherence in the banking sector profoundly challenges the foundational simplicity of the TAM, which was confirmed by the finding that security and compliance act as a nonnegotiable veto point, ultimately superseding both PU and PEOU.

Consequently, there is a critical need for further study focused on developing a Contextualized TAM (C-TAM) for regulated industries. A new theoretical model is needed to explicitly incorporate high-stakes external constraints, as current TAM extensions typically treat external variables as mere moderators, failing to account for the fact that they often function as absolute barriers, or "regulatory preconditions," in finance. The key research question for this investigation is as follows: How does introducing a "regulatory compliance constraint" (a nonnegotiable external variable) into the extended TAM framework alter the predictive power of PU and behavioral intention to adopt complex technologies like MSA? Successfully developing this model would provide researchers with a more robust theoretical tool for analyzing IT adoption across other highly regulated sectors, including healthcare, defense, and government, offering a better predictive capability than current models.

## Reflections

This section reflects the researcher's experience during the qualitative pragmatic inquiry into the adoption of MSA in the banking sector. It addresses potential biases, the researcher's influence on the process, and the resulting changes in thinking.

**Personal Biases, Preconceived Ideas, and Values**

As a researcher with a professional background in information, the study acknowledges several potential biases that could influence the interpretation of the qualitative data. A bias toward technology advocacy (confirmation bias) stemmed from a strong belief in the technical superiority of MSA and DevOps practices, particularly the value placed on agility and scalability. This preconceived idea carried the risk of overemphasizing positive outcomes, such as improved performance and operational agility, while understating the human and organizational costs associated with complexity and governance. Specifically, this bias could lead to viewing participant skepticism as a mere lack of "readiness" rather than recognizing it as a valid operational barrier.

A second potential bias was a pragmatic/action-oriented focus, driven by a professional desire to find tangible solutions and best practices. This created a risk of prioritizing the implementation strategies theme and potentially steering interview questions toward prescriptive advice, which could have inadvertently limited the organic emergence of broader cultural or institutional insights. Finally, a banking sector context bias arose from my familiarity with the industry's risk-averse culture and the dominance of security and compliance. This familiarity created a potential for overinterpretation of compliance concerns, which could have skewed the results to suggest that regulatory constraints are always the primary driver of adoption, potentially overshadowing other critical factors, such as existing technical debt or cost considerations.

### The Researcher's Effect on the Participants or the Situation

In a qualitative study involving peer-level professionals, the researcher's presence and professional identity can influence participant responses:

- Establishing rapport and credibility: My background in IT, combined with specific experience in monolithic and microservice architecture (as required by the screening criteria), was generally positive. It facilitated the use of technical language and enabled deeper probing into complex topics, such as data ownership and CI/CD pipeline maturity, leading to richer, more detailed data. This common professional ground likely reduced participant inhibitions about sharing technical failures or strategic concerns.
- The "expert" effect: Despite rigorous adherence to a semi-structured script, participants may have tailored their responses to align with what they perceived the "expert" researcher expected to hear—particularly regarding the positive rhetoric around team autonomy and DevOps, which are culturally aspirational concepts in IT. The use of leading terms like "microservices" and "DevOps" in the inquiry's title (Implementation Strategies for Microservice Architecture...) could have subtly biased participants toward discussing success stories rather than critical failures.

### Changes in Thinking Resulting from the Study

The research process challenged the researcher's initial biases, leading to several significant shifts in thinking that ultimately refined the study's conclusions:

- Shift from technical superiority to contextual necessity: The most profound shift was moving away from the belief that MSA is universally superior to the realization that it is only necessary when strategically aligned with business needs. The initial bias was tempered by the constant refrain from participants: "No architecture change without a compelling business driver." This confirmed that PU is fundamentally rooted in strategic necessity, not technical elegance.
- Re-evaluation of "barriers" as strategic vetoes: The initial conception of barriers and risks was that they were obstacles to be overcome. The research revealed that security and compliance are not an obstacle, but rather a prerequisite or a veto point. This elevated the importance of regulatory constraint in the theoretical model, concluding that the incremental migration strategy is a risk-management technique first and a technical strategy second.
- Redefining "readiness" as a continuous investment: I initially viewed organizational readiness as a checklist to complete before migration begins. The findings showed that DevOps maturity and cultural shift are continuous, ongoing investments required to sustain the architecture. The high PEOU enabled by automation is fragile; the organization must perpetually invest to keep the complexity manageable, thus tying ongoing investment directly to realizing operational agility.

## Summary and Study Conclusions

The pragmatic inquiry into MSA adoption in the banking sector concludes that successful implementation is not driven by technical merit or industry trends, but by a strategic, risk-centric alignment of architecture with high-stakes business and regulatory needs. The study only validated the TAM after recognizing that the banking context modifies its core tenets.

### Core Findings Synthesized

The research yielded five integrated conclusions across the key thematic areas:

1. MSA is a business necessity, not a trend: The primary driver of adoption is the need to address specific business needs (e.g., faster time-to-market, core system resilience), rather than merely following industry trends. This reinforces that PU is validated by solving a strategic problem, making adoption fundamentally business-led.
2. Compliance is a veto point, not a barrier: The barriers and risks theme established that security and compliance act as a nonnegotiable constraint that supersedes the potential benefits of MSA. The inherent architectural complexity only becomes manageable through highly disciplined, slow, and reversible methods.
3. Readiness is a precondition for implementation: Organizational readiness is a mandatory requirement. Without sustained leadership support and a mature cultural shift toward end-to-end ownership (team autonomy), the organization

cannot manage the complexity of the architecture. Furthermore, high DevOps maturity is essential to maintain a distributed system's PEOU.

4. Strategy must be contingent and incremental: The implementation strategy must prioritize risk mitigation over speed. The incremental migration strategy (e.g., Strangler Fig Pattern) is professionally required to maintain regulatory compliance and business continuity. Tools and technology are critical enablers that operationalize the required DevOps maturity.
5. Outcomes validate strategic alignment: Successful adoption culminates in realizing key perceived outcomes, including improved performance (enhanced resilience and scalability) and operational agility (faster time-to-market). Crucially, these technical results were always framed by participants as successful business alignment, validating the initial strategic driver.

**Concluding Statement**

Adopting a microservice architecture in the regulated banking sector is not merely a technical migration, but a strategic transformation project defined by risk management and organizational maturity. Success is predicated on recognizing that security and compliance form an absolute regulatory boundary, forcing a conservative incremental migration strategy. The key takeaway for IT leaders is that you must first establish the culture and automate the necessary capabilities (organizational readiness) that make the architecture manageable, because agility is a byproduct of resilience, not its substitute. The implementation strategy, therefore, is not about how fast you move, but about maintaining control at every step.

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