

Examining the Effectiveness of RegTech Solutions in Strengthening Regulatory Compliance: An Integrative Study of a Private Omani Bank

¹Nusrat Jahan, <https://orcid.org/0009-0001-7951-1713>

¹Syeda Umme Habiba, <https://orcid.org/0009-0003-0267-6995>

¹Prakash Kumar Udupi, <https://orcid.org/0000-0003-4879-819X>

¹Vikas Rao Naidu., <https://orcid.org/0000-0001-7354-172X>

¹Santhosh John, <https://orcid.org/0009-0001-3243-882X>

¹Middle East College, Muscat, Al Rusayl, Sultanate of Oman

Corresponding Author: *Nusrat Jahan (email: 20f20553@mec.edu.om)

Abstract— The concept of ‘RegTech’ has emerged to signify the technology that regulated firms are utilizing to increase their focus on risk and compliance. Despite the growing global interest, only few studies have examined the effects and adoption of RegTech, especially within the Omani business landscape. By studying AI-driven RegTech solutions at a private bank in Oman, this live project seeks to fill in research gaps and raise awareness among banks in the country. Between 2024 and 2032, the global RegTech industry is projected to expand at a compound annual growth rate of 23.6%. This research explores the role, impact, challenges, and key factors influencing AI-powered RegTech integration. Employing a mixed-method approach, the study integrates quantitative data from a survey of 105 employees and qualitative insights from interviews with the head of compliance and the head of IT. Data analysis, conducted with Microsoft Excel, JASP 0.18.3, and SmartPLS 4, includes descriptive statistics, t-test, regression, p-value, and ANOVA analyses. Findings indicate a positive relationship between AI-driven RegTech implementation and enhanced regulatory compliance at the private bank, supporting the hypotheses. This study provides valuable insights for Omani banks and serves as a reference for future research on AI and RegTech in the banking sector.

Index Terms— Artificial Intelligence (AI), Automation, FinTech, Private Bank in Oman, RegTech, Regulatory Compliance, Regulatory Technology

I. INTRODUCTION

A key instrument for improving compliance and risk management procedures, regulatory technology (RegTech) has emerged as a result of the exponential rise of technology, which has had a profound effect on the financial industry [1]. A well-known international bank used artificial intelligence (AI) in regulatory technologies in 2023 to improve compliance processes. The bank automated its KYC (Know Your Customer) procedures by utilizing machine learning algorithms, which resulted in a considerable reduction of manual review times from weeks to hours. The AI solution improved fraud detection capabilities and ensured compliance with AML (Anti-Money Laundering) standards by analyzing

client data for risk indicators more accurately. The bank's regulatory posture was further reinforced by real-time transaction monitoring and alerts for questionable activity. The bank reduced compliance costs by 30% and increased regulatory reporting efficiency by 40% by incorporating AI into its compliance framework. In addition to strengthening regulatory compliance, this ground-breaking application of AI established the bank as a pioneer in implementing cutting-edge technology to reduce risks and enhance operational efficacy in the ever-changing financial sector. According to Fortune Business Insights [2], the global RegTech market is predicted to rise by 23.6% between 2024-2032, from 12.82 billion dollars to 85.99 billion dollars. Advances in the regulatory technology paradigm began with the 2008 financial crisis. As demonstrated by the Basel II Capital Accord, the initial phase (RegTech 1.0) was the use of technology to simplify internal processes at large financial institutions in order to reduce the burden and cost of compliance. The second stage, RegTech 2.0, was spurred by the tremendous costs incurred by the financial sector as a result of complying with emerging regulations following the global financial crisis. As RegTech evolves into its third stage, RegTech 3.0, it will enable firms to build a more robust financial system by reimagining finance and its regulation through technological means [3].

II. PROBLEM STATEMENT

The concept of 'RegTech' remains relatively new in the Middle East, especially in Oman, resulting in a scarcity of published research about the adoption of RegTech and its impact on Omani enterprises. Furthermore, concerns about the effectiveness of RegTech and its possible effects on regulatory compliance are raised by its implementation. Oman, as a developing nation, would benefit from further contributions in the form of RegTech solutions and strategies to facilitate adoption and aid enterprises. Thus, this research aims to examine, analyze, and recommend effective strategies for private banks, with a specific focus on optimizing the

deployment of RegTech solutions by combining elements of theoretical research with empirical analysis to present an in-depth comprehension of the study problem. It attempts to address the research gaps by investigating a variety of RegTech-related topics in Oman, thereby enhancing the knowledge base and fostering greater awareness among local institutions. The proposed framework has the potential to benefit not just the private bank but also other financial institutions both regionally and worldwide.

III. RESEARCH OBJECTIVES

- To explore the bank's present regulatory compliance framework
- To investigate the use of RegTech solutions driven by AI in the banking and financial sectors and the related obstacles
- To examine how AI-powered RegTech solutions could affect the bank's regulatory compliance procedures' efficacy and efficiency
- To evaluate the main elements affecting the company's successful adoption of RegTech
- To construct and deliver a framework that would maximize the incorporation of RegTech solutions in accordance with Oman Vision 2040

IV. RESEARCH HYPOTHESES

- H1: The efficiency of the bank's regulatory compliance is improved by the implementation of RegTech solutions
- H2: The efficiency with which an organization complies with regulations is positively and significantly affected by its readiness
- H3: The effectiveness of regulatory compliance is mediated by the degree to which an organization is prepared to use RegTech solutions

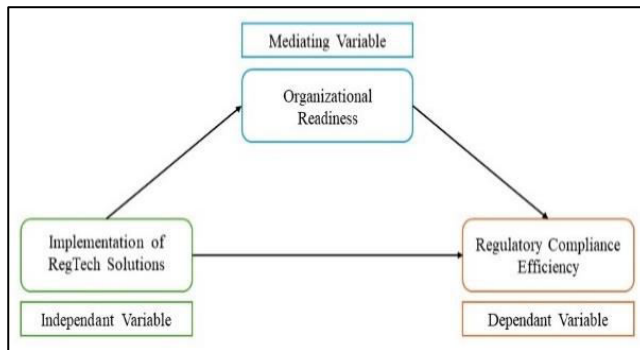


Fig. 1. Conceptual Framework

The conceptual framework shown in Figure 1 illustrates the links between the three main research variables: the efficacy of regulatory compliance, organizational readiness, and the implementation of RegTech solutions. This model is useful for conceptualizing, from the standpoint of organizational readiness, how the implementation of RegTech solutions

impacts the efficacy of regulatory compliance. This study aims to examine the impact of RegTech solution adoption on regulatory compliance effectiveness using RegTech as the main independent variable. The efficacy of regulatory compliance is the dependent variable that this study aims to explore. High efficiency and cost-effective compliance procedures may be possible as a consequence of the framework's demonstration of how RegTech solutions may significantly affect this efficiency. Organizational readiness serves as the mediating variable, meaning that the adoption of RegTech solutions on the effectiveness of regulatory compliance is facilitated by the organization's preparedness to employ these technologies rather than being directly impacted by them.

V. LITERATURE REVIEW

Financial Technology (FinTech): FinTech is a significant transformation in the financial services industry, driven by the integration of advanced technology to improve financial procedures and services [4]. FinTech encompasses numerous purposes, including electronic payments, peer-to-peer funding, robo-advisors, and blockchain technology. These technologies have revolutionized conventional banking by enhancing consumer experience, increasing accessibility, and reducing operational expenses [5]. Nevertheless, the rapid advancement of technology has introduced additional concerns, particularly in relation to risk management and regulatory compliance. RegTech, has emerged as a crucial component of the broader FinTech ecosystem to address the legal issues posed by these technical advancements [6].

Regulatory Technology (RegTech): RegTech uses AI, machine learning, and big data analytics to streamline and improve regulatory compliance processes. Although the word has subsequently taken on numerous interpretations based on the viewpoint of various stakeholders, it was initially introduced in 2015 by the Financial Conduct Authority (FCA). According to the FCA, RegTech is defined as “a subset of FinTech that uses innovative and integrated technology to facilitate the delivery of regulatory requirements more effectively and efficiently than existing capabilities”. The Institute of International Finance articulates RegTech as “the use of new technologies to solve regulatory and compliance requirements more effectively and efficiently” [7]. The three main domains of RegTech application are (displayed in Figure 2): regulatory compliance, governance, and risk management.

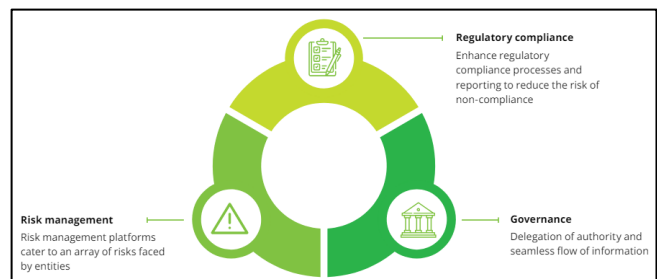


Fig. 2. Application of RegTech Solutions

The synergy between Artificial Intelligence and RegTech:

Artificial intelligence (AI) is the study and development of computer systems with the ability to do tasks normally performed by humans, such as learning new patterns, making decisions, and recognizing spoken language. By reducing the possibility of human mistake in areas that do not require human involvement, AI helps automate operations, which in turn saves time and money [8]. By utilizing machine learning algorithms, AI can swiftly evaluate massive volumes of data, spotting patterns and outliers that humans may overlook. Intelligent document processing (IDP) and robotic process automation (RPA) are two technologies that can automate the reporting and paperwork needed to comply with regulations. Utilizing natural language processing (NLP) helps in identifying compliance issues by evaluating unstructured data from sources like legal documents, social media, and emails. By combining RegTech's extensive know-your-customer (KYC) platforms with AI's advanced analytical abilities, more complete and effective customer due diligence (CDD) is achieved, lowering the possibility of regulatory breaches and boosting security overall [9].

Regulatory compliance systems/tools: To ensure that present-day financial institutions follow all applicable rules and regulations while keeping risk to a minimum, regulatory compliance solutions are a necessity. The following are seven prominent regulatory compliance systems: Governance, Risk, and Compliance (GRC) software, anti-money laundering (AML) solutions, policy management software, know-your-customer (KYC) solutions, regulatory change management tools, incident management systems, and training and awareness platforms [10]. Additionally, AI-driven robotic process automation (RPA) may greatly minimize time and effort needed for compliance reporting by automating repetitive operations like entry of data, report preparation, and filing. Among regulatory technologies, RPA distinguishes out due to its relatively straightforward application benefits, according to Von Solms [11].

Oman's Regulatory Environment: To ensure the safety, soundness, and efficacy of Oman's financial system, the Central Bank of Oman (CBO) sets regulations and standards and monitors the banking industry's adherence to them. The CBO's regulatory framework covers a wide range of matters including corporate governance, risk management, AML, and CFT (combating the financing of terrorism). Establishing effective councils and panels to oversee operations and guarantee responsibility is a requirement the CBO encourages banks to do as part of its focus on corporate governance. The CBO also demands frequent stress testing and adherence to the Basel III framework in addition to AML or CFT standards. The goal is to make the banking sector more resilient to economic and financial shocks. To maintain a robust and globally competitive financial system, the government of Oman follows regulations set out by organizations such as the Financial Action Task Force (FATF) [12].

Obstacles related to the Implementation of RegTech: Following regulations intended to protect personal information

is the biggest obstacle to fulfilling the fundamental right to RegTech, according to research carried out in Spain by Rambaud and Gázquez [13]. Concerns about privacy in future years will be influenced by both business and government legislation. Businesses have financial interests as well as the public's demand for data privacy, and finding a middle ground will be difficult. Businesses should either charge consumers for data consumption or governments should institute a new system whereby individuals pay for digital services with the guarantee that their data would be securely stored. Problems with data quality, unreliability of third parties, interpreting regulations, integrating with legacy systems, having inadequate funds, not having enough solutions available, and experiencing bias and unclear explanations are all major obstacles [14].

Effects of RegTech adoption on the efficacy and efficiency of compliance procedures: A more complex and rigorous regulatory environment is increasingly encountered by regulated businesses. Maintaining compliance with rules is critical for a number of reasons, including avoiding costly fines and damage to a company's brand and the confidence of investors and consumers. It is essential to employ agile solutions in order to stay at the forefront of the constantly evolving business models, risks, and regulations. From 2008 to 2016, the number of regulatory changes recorded by organizations scaled from 10 to over 200, and this trend is anticipated to continue [13]. Reducing costs related to noncompliance with regulatory requirements, improving the efficiency of processes, and increasing confidence in the openness of reporting are the main goals of implementing RegTech solutions. Based on their research, Teichmann et al. [14] concluded that RegTech solutions can help businesses save time, money, and effort by improving the evaluation of regulatory data. No matter how sophisticated the technology is, the RegTech systems will fail due to the lack of expertise of the individuals running them. Additionally, the study found that RegTech can automate risk management activities by detecting risks through real-time data monitoring. Technological advancements in RegTech have prompted its growth into new domains of financial stability monitoring, such as digital risk detection in the banking industry, early alert systems for financial market risks, monitoring of discrepancies in global capital flows, anti-money laundering surveillance, etc. The aforementioned difficulties have recently attracted the attention of central banks. Therefore, RegTech can help regulators reduce the regulatory burden and improve the efficiency of risk monitoring and detection [15].

Critical elements impacting the effective incorporation of RegTech solutions: Many important factors, including the degree of regulatory backing, the state of the technical infrastructure, and the preparedness of the organization, determine whether or not banks can effectively apply RegTech solutions. Having the support of regulators is crucial for RegTech solutions to be made available and used. An organization's technical infrastructure drastically impacts the incorporation of RegTech solutions. A strong and extensible IT infrastructure is essential for banks to manage the intricate analytics and processing needed by RegTech solutions [16].

Big data analytics, cloud computing, and artificial intelligence are all part of this. The organization's readiness, which encompasses the preparedness of human resources and the versatility of business procedures, profoundly affects the efficacy of implementing RegTech. Financial institutions should promote a mindset of constant learning and innovation in order to withstand the dynamic regulatory landscape. This calls for staff to acquire new skills and for businesses to seek out candidates with backgrounds in technology and regulatory compliance [7].

Reliable Models for RegTech Solution Integration

Optimization: Figure 3 is an illustration of Fred Davis's 1986 Technology Acceptance Model (TAM), which he created to help clarify how individuals accept and utilize new technology. The goal of TAM, which is derived from Theory of Reasoned Action (TRA), is to highlight the elements that impact the acceptance and use of technology [17]. This model suggests that there are a number of elements that influence people's decisions about whether and how to use new technologies. The key components of TAM include Perceived Usefulness (U), Perceived Ease of Use (E), External variables, Attitude toward using (A), Behavioral intention to use (BI), and Action system use.

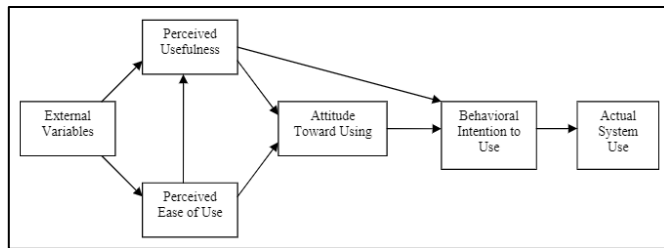


Fig. 3. Technology Acceptance Model (TAM)

Expanding on the original TAM, Venkatesh and Davis created TAM2 (Figure 4) in 2000 to incorporate new factors influencing technology acceptability and to fix some of the shortcomings of TAM. The additional elements in TAM2 are Social Influence Processes (subjective norm and image) and Cognitive Instrumental Processes (job relevance, output quality, and result demonstrability). Along with the initial Perceived Usefulness and Perceived Ease of Use, these factors significantly affect the user's motivation to adopt technology, according to TAM2. It incorporates the ideas of experience and voluntariness to reduce the impact of subjective standards on intent to use [18].

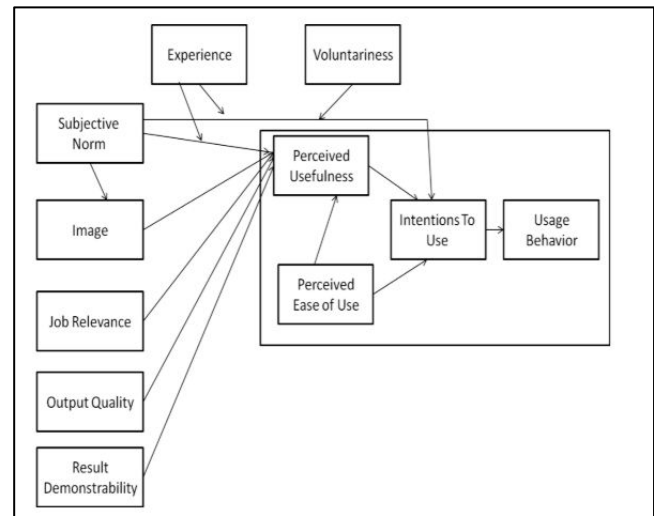


Fig. 4. Technology Acceptance Model 2 (TAM2)

The third version of TAM, which was created by Venkatesh and Bala in 2008 (Figure 5), adds to the previous version by containing more factors that affect Perceived Usefulness and Perceived Ease of Use. Determinants of Perceived Ease of Use include Anchors (computer self-efficacy, perceptions of external control, computer anxiety, and computer playfulness) and Adjustments (perceived enjoyment and objective usability). Determinants of Perceived Usefulness include image, job relevance, output quality, and result demonstrability. Along with considering the main components of U and E, TAM3 also considers the moderating effects of Experience and Voluntariness on the relationships between these elements [19].

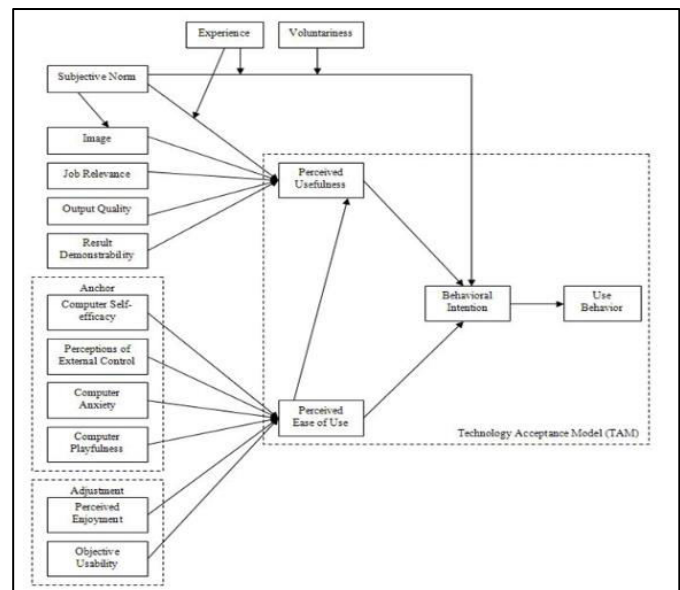


Fig. 5. Technology Acceptance Model 3 (TAM3)

For a thorough understanding of how users embrace IT, Venkatesh et al. [20] presented the Unified Theory of Acceptance and Use of Technology (UTAUT), as illustrated in Figure 6. The model draws on eight well-known ideas of how people embrace new technologies. A user's intents to utilize technology and their subsequent use behavior are impacted by

the four main variables defined by the UTAUT model: performance expectancy, effort expectancy, social influence, and facilitating conditions. Gender, age, experience, and voluntariness of use are four factors that impact the links between these fundamental dimensions and behavioral intention or usage behavior. How strongly and in what direction these associations go is heavily influenced by these elements. As an example, anticipation of effort may be more important to new users than expectancy of performance for experienced ones.

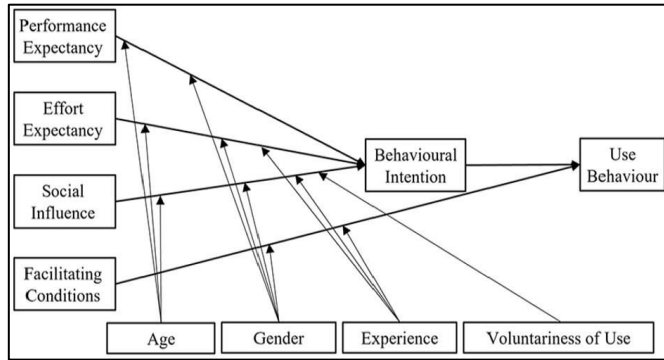


Fig. 6. UTAUT Model

Venkatesh et al. [21] presented UTAUT2, an updated version of the initial model that is more applicable to consumer technology settings. To narrow down on elements that matter most to consumers, the model adds three new constructs: hedonic motivation, price value, and habit. In an attempt to provide a more all-encompassing framework for understanding consumer technology acceptance, UTAUT2 incorporates the additional components while retaining the old moderators (gender, age, experience, voluntariness of use).

VI. RESEARCH METHODOLOGY

Research Design: The Research Onion model, developed by Saunders et al. [22], is depicted in Figure 7, which shows the stages of the methodology creation process. A different part of the research process is represented by each of the six tiers of the model. As a research philosophy, pragmatism is the best fit for this study. The pragmatic approach allows for the integration of qualitative and quantitative data, which in turn provides useful insights into how well RegTech solutions enhance regulatory compliance. This study uses an inductive method to establish hypotheses; it observes a sample first, and then constructs theories from those patterns. Using a mixed-method approach, this study makes use of both survey and case study methodologies. It is a cross-sectional research, and the methods of data collecting and analysis are explained in more depth below.

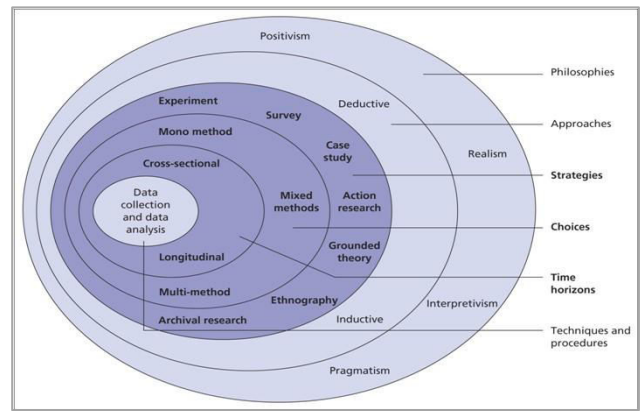


Fig. 7. Saunderson's Research Onion Model

Population, Sample Size, and Sampling Technique: The study's population consists of 144 individuals, including the Head of Compliance and Head of IT as well as the entire staff in the departments of strategy and transformation, risk, IT/digital transformation, and compliance. The total population size for the survey questionnaire is 144, with 105 participants selected at random. The survey is sent out to 105 people who work for a private bank in Oman. For the sake of cost-effectiveness and ease of pilot testing, this study employs non-probability convenience sampling. The ease of data collection and the usefulness of discovering relationships between variables (testing hypotheses) are both enhanced by convenience sampling.

Research Instruments and Validity and Reliability Testing: Interviews and questionnaires make up the research tools used in this mixed-method study, which combines quantitative and qualitative data. Ten bank employees with in-depth knowledge of the subject were selected to fill out the questionnaire and provide feedback on the instrument's validity and reliability. With a value of 0.828, the Cronbach's alpha is considered to be of good quality. Variables close to 0 indicate low dependability, whereas those close to 1 indicate high reliability [23]. This means that the questionnaire is appropriate and reliable, with a result of 0.8.

Data Collection and Analysis Techniques: Primary data for this study comes from two sources: interviews and questionnaires. The compliance chief and the head of IT are each interviewed using predetermined questions. The 105 staff members of an Oman-based private bank were asked to fill out an online survey. Articles in scholarly journals, books, periodicals, newspapers, and online resources including corporation reports and websites are examples of secondary sources. Key themes, codes, and patterns in the interview are being identified through thematic analysis of qualitative data in this study. The quantitative data that has been obtained is examined by means of data analysis tools such as SmartPLS, JASP, and Microsoft Excel. ANOVA, descriptive statistics, t-tests, regression, and p-values are some of the statistical methods used.

VII. DATA ANALYSIS AND INTERPRETATION

Qualitative Data Analysis

Thematic Analysis of Qualitative Data: This part delves further into the themes and codes uncovered during two interviews with the head of compliance and the head of IT (illustrated in Figure 8). The bank has a robust regulatory compliance system that successfully integrates regulations from the Central Bank of Oman across departments; however, to prevent compliance breaches, there is a need for improved system integration, particularly in commercial and international transactions, as highlighted by both interviewees. Some notable challenges include the lack of clarity in regulatory requirements, the decentralized management of customer data, and the use of outdated systems, particularly for international transactions.

No.	Themes	Codes
1.	Current Regulatory Compliance System	- Integration and implementation - Communication and assessment - Areas for improvement
2.	Challenges in Current Regulatory Compliance	- Regulatory updates - Customer information management - System integration - Departmental compliance
3.	Utilization of Technology and Software Solutions	- Existing tools - Digital reporting and collaboration
4.	Role of RegTech Solutions	- Enhanced compliance - Advanced technologies
5.	Specific RegTech Solutions for Ahli Bank	- AI and Machine Learning - Blockchain - Regulatory reporting tools - KYC and customer due diligence
6.	Key Factors for Successful Integration of RegTech Solutions	- Regulatory alignment - Executive support - IT infrastructure compatibility - Training and change management - Data quality and governance - Cybersecurity and data privacy
7.	Impact of RegTech Implementation on Efficiency and Effectiveness	- Automation and streamlining - Proactive risk management - Enhanced decision-making - Cost reduction
8.	Strategic Initiatives for Alignment with Oman Vision 2040	- Government collaboration - Investment in technology - Skills development - Regulatory compliance and governance - Cybersecurity and data protection - Customer-centric approach

Fig. 8. Identification of Themes and Codes

The bank employs a range of software and technological solutions, including KYC and AML, to provide real-time customer validation and monitoring. Proactive risk mitigation is demonstrated by the bank's adoption of automated compliance processes and technologies for criminal background checks and sanction screening. Blockchain, AI, and machine learning are examples of RegTech technologies that are considered to be revolutionary for improving regulatory compliance. The bank's compliance abilities may be strengthened even further by utilizing specialized technologies like AI-powered transaction surveillance and all-inclusive regulatory reporting solutions like AxiomSL.

Regulatory alignment, IT infrastructure compatibility, stakeholder commitment, executive support, ongoing staff training, and strong cybersecurity policies are all necessary for effectively incorporating RegTech solutions. In line with Oman Vision 2040, RegTech deployment is expected to increase the efficiency of regulatory compliance through automation, enhanced analytics, and a decrease in human error.

To maximize RegTech integration, the bank's strategic objectives should concentrate on digital transformation, skill development, and promoting an innovative culture. In promoting national goals, this maintains operational excellence and sustained compliance. In conclusion, both interviewees emphasize the need for strategic planning and investment in these areas, acknowledging that RegTech has the potential to greatly improve compliance tasks through automation and advanced technology.

Quantitative Data Analysis

Descriptive Statistics Analysis: Summarizing and organizing data to reveal its key traits and patterns is made easier with descriptive statistics. Common metrics used in this type of analysis include mode, median, and mean as well as range, variance, and standard deviation for measuring variability.

Statistical Analysis of Demographic Data

Table 1. Descriptive Statistics of Demographic Data

<i>Statistical Measures</i>	<i>Gender</i>	<i>Nationality</i>	<i>Educational Level</i>	<i>Department</i>	<i>Work Experience</i>	<i>RegTech Experience</i>
Mean	1.190	1.067	3.533	2.590	2.486	2.4
Standard Error	0.039	0.024	0.074	0.093	0.120	0.118
Median	1	1	3	3	2	2
Mode	1	1	3	2	2	1
Standard Deviation	0.395	0.251	0.760	0.958	1.233	1.206
Sample Variance	0.156	0.063	0.578	0.917	1.521	1.454
Kurtosis	0.569	10.627	-0.448	-0.962	-0.742	-0.870
Skewness	1.599	3.525	0.755	0.038	0.441	0.391

Range	1	1	3	3	4	4
Minimum	1	1	2	1	1	1
Maximum	2	2	5	4	5	5
Sum	125	112	371	272	261	252
Count	105	105	105	105	105	105

Insightful observations regarding the respondent characteristics are provided by the descriptive statistics for the demographic data. The gender breakdown shows that men are more prevalent than females, with a mean of 1.19 and a standard deviation of 0.39. Gender disparity in the workplace can be impacted by cultural, social, and economic factors, but to different extents. Several variables, like cultural standards and expectations, educational attainment, difficulties in achieving a work-life balance, etc., could affect the gender distribution within an organization [24]. Through the implementation of inclusive recruiting policies and the provision of chances for professional progress, the bank may endeavor to support policies that empower women in order to attain gender parity in job roles.

With a mean of 1.07 and a standard deviation of 0.25, the nationality data shows that most of the respondents are Omani. Within the company, there is a notable disparity in the proportion of nationalities. This is a direct outcome of the government's Omanization initiatives, which seek to provide employment prospects for young and experienced Omani citizens. The number of foreign workers in Oman fell by 15.7% in 2020, 4.2% in 2019, and 3.6% in 2018, according to the National Statistics Agency [25]. The nature of the occupations that must be strictly followed to by enterprises created in Oman determines the Omanization rate, which varies among industries [26]. The fact that 7% of the respondents are expats shows that the bank values diversity and appreciates the skills and knowledge that expats bring to the board.

The median and mode for educational level are 3 and 0.76, respectively, suggesting that most respondents have a bachelor's degree, with a master's degree being the next most common, and a mean of 3.53 for the educational level. An educated staff is essential for a financial institution to remain competitive in the market, develop its leadership potential, build stronger networks and partnerships, and maintain a professional work environment.

A mean of 2.59 and a standard deviation of 0.96 are displayed in the departmental data analysis. This indicates that there is a diversified representation from several departments, with a slight push towards the IT/digital transformation department. The data on work experience shows that there is a wide range of experience levels among employees, with the majority of respondents having one to three years of experience. The standard deviation is 1.23, and the mean is 2.49. Finally, the

most common level of RegTech solution experience among respondents is intermediate, as shown by the data, which has a mean of 2.4 and a standard deviation of 1.21. That being said, in order to accomplish the project's goal of improving the bank's regulatory compliance procedures through targeted RegTech integration, more training and development is required to raise knowledge and competence with RegTech solutions.

Statistical Analysis of Effectiveness of Current RegTech and Challenges Associated with Current RegTech

Table 2. Effectiveness and Challenges Associated with Current RegTech

Statistical Measures	Effectiveness of Current RegTech	Challenges associated with Current RegTech
Mean	3.152380952	2.676190476
Standard Error	0.064593619	0.095210619
Median	3	2
Mode	3	2
Standard Deviation	0.661887633	0.975618523
Sample Variance	0.438095238	0.951831502
Kurtosis	1.058551722	-1.465092966
Skewness	0.635518176	0.50378388
Range	3	3
Minimum	2	1
Maximum	5	4
Sum	331	281
Count	105	105

The descriptive statistics of Questions 8 (Q8) and 10 (Q10) are displayed in Table 2, where the total number of respondents is 105. The efficacy of the present regulatory compliance system is investigated in Q8, while the difficulties connected with the present regulatory compliance procedures at the bank are investigated in Q10. With a mean score of 3.15 and a median of 3, Q8 shows that most respondents (66%) think the bank's existing method for complying with regulations is somewhat successful. Although there is considerable fluctuation, a large percentage of responses are grouped around the mean, as shown by the standard deviation of 0.66. A highly peaked distribution is indicated by a kurtosis value of 1.06, which shows that responses are concentrated around the center value. The bank's current regulatory compliance system needs changes due to its moderate efficacy. Q8 has a positive

skewness of 0.63 and Q10 a positive skewness of 0.50. With a positive skewness of 1, most people choose "very ineffective," "ineffective," or "moderately effective" when answering question 8. Lack of technical integration, complicated regulatory requirements, and budget limits are the first three options for Q10.

With a mean of 2.68 and a median of 2, the majority of respondents (60%) identified the complexity of regulatory requirements as the key issue with the existing regulatory compliance system. With a standard deviation of 0.98, the replies are more varied compared to Q8, indicating that people have various viewpoints about the problems given. The answers are more dispersed and less concentrated around the mean, as seen by the flatter distribution with a negative kurtosis value of -1.47. Among the many challenges, 63 respondents cited the complexity of regulatory requirements as the most significant, while 35 respondents cited a lack of knowledge and training as the second most significant. In light of these findings, it is clear that the streamlining of training programs and the reduction of regulatory requirements are two of the most important factors to consider when putting RegTech into action. The project's goal is to improve the bank's regulatory compliance preparedness and efficiency, therefore this is in line with that.

t-test

Table 3. t-test: Two-Sample Assuming Equal Variances

	Male	Female
Mean	2.576471	2.3
Variance	0.294678	0.536842
Observations	85	20
Pooled Variance	0.339349	
Hypothesised Mean Difference	0	
df	103	
t Stat	1.909658	
P(T<=t) one-tail	0.029480	
t Critical one-tail	1.659782	
P(T<=t) two-tail	0.058960	
t Critical two-tail	1.983264	

A t-statistic of 1.9097 indicates that the mean rating for males is 2.576 while for females it is somewhat lower at 2.3. The one-tailed test yielded a p-value of 0.0295, which is lower than the 0.05 criterion of significance. When a one-tailed test is used, this means that there is a statistically significant difference in the knowledge and comprehension of RegTech solutions between male and female personnel. This is in contrast to the two-tailed test, where the p-value is 0.0590—just over the significance level of 0.05. This means that when both sides of the difference are considered, the difference is

not statistically significant at the 5% level.

It is worth noting that there is a higher degree of variability in the replies given by female employees (0.5368) compared to male employees (0.2947). In a two-tailed environment, the discrepancy is not statistically significant, despite being close, even though men had a slightly higher mean awareness rating. Despite the perception that male employees have a better grasp of RegTech solutions, the results do not support the idea that there is a significant gender gap. By ensuring a more consistent knowledge of RegTech solutions throughout the business, this research underlines the importance of focused awareness and training initiatives that successfully engage both genders.

Regression Analysis

Table 4. Regression Statistics

Regression Statistics	
Multiple R	0.34954
R Square	0.12218
Adjusted R Square	0.11365
Standard Error	0.65688
Observations	105

	df	SS	MS	F	Significance F		
Regression	1	6.1856	6.1856	14.335	0.00026		
Residual	103	44.442	0.4314	8			
Total	104	50.628	57				

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95%	Upper 95%
Intercept	2.5	0.48	5.1712	0.0000	1.4412	3.4588	1.4412	3.4588
Potential impact	0.426	0.11	3.7862	0.0006	0.2029	0.6494	0.2029	0.6494

Table 4 displays the results of a regression analysis that tries to identify how individual views on RegTech's ability to improve regulatory compliance procedures relate to their expectations for the effect that RegTech solutions may have on compliance. With a Multiple R value of 0.349, the regression results show that the two variables are moderately related linearly. The degree of agreement with the potential of RegTech solutions (the independent variable) explains around 12.2% of the variance in the impression of RegTech's

influence (the dependent variable), according to the R Squared value of 0.122. The Significance F value of 0.000257 proves that this percentage is statistically significant, even if it is minor in magnitude compared to the conventional alpha threshold of 0.05. This result adds support to the idea that RegTech potential should be included as a key component of the model.

Consistent with the claim that RegTech solutions enhance compliance procedures, the 'Potential effect' coefficient reads 0.426, suggesting that the perceived influence on regulatory compliance increases by 0.426 units for every unit increase. Additionally, the extremely low p-value (0.000257) for this coefficient lends support to the predictor's model relevance. The fact that the coefficient's confidence ranges do not contain zero further supports the reliability of this connection (0.202 to 0.649). Thus, the results of the regression analysis provide evidence to the idea that individual's optimistic views of RegTech's capabilities are correlated with their more favorable assessments of its effects on regulatory compliance.

ANOVA Analysis

Table 5. ANOVA: Single Factor Analysis

Groups	Count	Sum	Average	Variance
Compliance department	13	32	2.46154	1.93590
IT department	39	90	2.30769	1.53441
Risk Management department	31	72	2.32258	0.95914
Strategy & Transformation department	22	56	2.54545	1.68831
Operations department	0	0	0	0

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.9947	4	0.248	0.170	0.952	2.462
Within Groups	145.76	10	1.457	60	94	61
Total	146.76	10				
	190	4				

Variance in perceptions about the main variables influencing the effective integration of RegTech solutions across different departments at the bank is examined in the ANOVA investigation. There is a small variation in the average answer for the key factor among departments, as shown in Table 5. With an average score of 2.545, the strategy and transformation department outperforms the other four departments: compliance (2.461), IT (2.308), risk management (2.323), and others. Despite the variations in averages, the

variance within departments is rather considerable, showing that each group has a significant range of ideas. Due to a lack of responses, the operations department is not included.

The F-statistic is 0.1706 and the associated p-value is 0.9529, both of which are larger than 0.05, as shown in Table 5. Given the strong p-value, it may be inferred that there is no notable variation in departmental perspectives on the elements impacting RegTech integration. This result is further supported by the F critical value (2.4626), which is much lower than the estimated F (0.1706). The essential components of effective RegTech integration are clearly department-specific. This highlights the widely acknowledged importance of having the support of administration, properly training workers, having clear regulatory guidelines, having compatible systems, and sufficient financial resources [27]. Also, getting different departments on the same page about these issues might make it easier for the bank to integrate RegTech solutions, which will lead to better regulatory compliance overall.

p-value Analysis

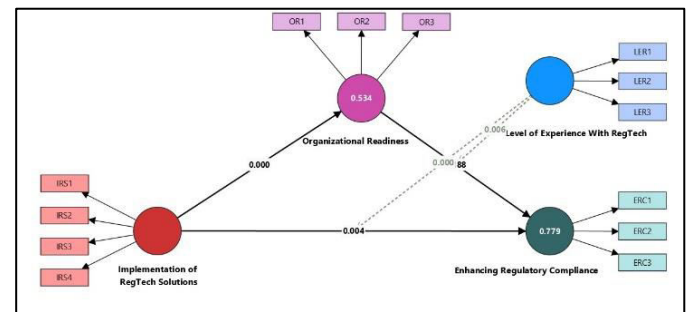


Fig. 9. Structure Model for p-Value

Research variables' interrelationships are evaluated using the structural model. In order to find out whether the route coefficients are statistically significant, it uses p-values. At the 5% threshold of significance, a p-value of less than 0.05 indicates that the association is statistically significant [28]. A significant link is shown by a t-value more than ± 1.96 or a p-value less than 0.05, as shown in Figure 9, which pertains to the structural model. The Figure shows that there is a strong relationship between implementing RegTech solutions (IRS) and improving regulatory compliance (ERC), with a p-value of 0.004, supporting the acceptance of hypothesis H1. It suggests that regulatory compliance is positively impacted by the direct implementation of RegTech solutions. On the other hand, organizational readiness (OR) might moderate this impact. With a p-value of 0.000, OR significantly affects ERC. The results show that organizational preparation significantly affects regulatory compliance efficiency, supporting hypothesis H2. Organizational preparedness and regulatory compliance efficiency are both affected by the amount of experience with RegTech; the more experienced an organization is with RegTech, the more prepared it will be to comply with regulations.

VIII. SUMMARY OF FINDINGS

- Results showed that men made up the majority of respondents (mean of 1.19, standard deviation of 0.39), highlighting the role of socioeconomic, cultural, and demographic factors in explaining the gender gap in the workplace. Therefore, inclusive recruiting procedures and opportunities for career advancement are critical for the bank to achieve gender parity. Success in Omanization efforts is shown by the fact that most responders are Omani (mean of 1.07, standard deviation of 0.25). The data on work experience (mean of 2.49, standard deviation of 1.23) and RegTech experience (mean of 2.4, standard deviation of 1.21) also indicate that the bank needs more training and development in order to be more compliant with regulations through enhancing knowledge and skills in RegTech solutions.
- The one-tailed test yielded a p-value of 0.0295, suggesting a statistically significant difference in the level of knowledge and awareness of RegTech solutions between male and female employees. On average, men employees scored higher.
- The perceived effect on regulatory compliance is strongly correlated with degree of agreement with RegTech solutions' potential, according to regression analysis results. With a significance F value of 0.000257 and a R Squared value of 0.122, the independent variable is highly significant, explaining 12.2% of the variance.
- Departmental viewpoints on the critical factors influencing the successful integration of RegTech solutions do not differ significantly (F-statistic = 0.1706, p-value = 0.9529), according to the ANOVA results. A successful RegTech integration requires financial resources, staff training, clear regulatory guidance, system compatibility, leadership support, and system compatibility, but common results vary somewhat between departments.

IX. CONCLUSION

With a focus on the Omani private bank, this study has methodically examined the impact of RegTech solutions on the efficacy of regulatory compliance in the banking business of Oman. The research is based on three main hypotheses: first, that regulatory compliance efficiency in banks is positively affected by the implementation of RegTech solutions (H1), second, that organizational readiness significantly and positively affects regulatory compliance efficiency (H2), and third, that organizational readiness mediates the relationship between regulatory compliance efficiency and the implementation of RegTech solutions (H3). A strong correlation between the usage of RegTech solutions and improved regulatory compliance efficiency was found in the quantitative data analysis, adding support to H1. In addition, the results support H2, highlighting how organizational preparation leads to a notable boost in compliance efficiency. Findings from the mediation study for Hypothesis 3 indicate that organizational preparedness plays a crucial mediating role between regulatory compliance and the efficiency with which RegTech solutions improve compliance. The importance of developing organizational preparedness via

targeted training and thorough planning to maximize the benefits of RegTech is reinforced by these findings. Financial institutions may make use of the study's thorough methodology to effectively integrate and implement RegTech solutions. This would provide a more conducive environment for banking while also improving their regulatory compliance processes.

X. RECOMMENDATIONS

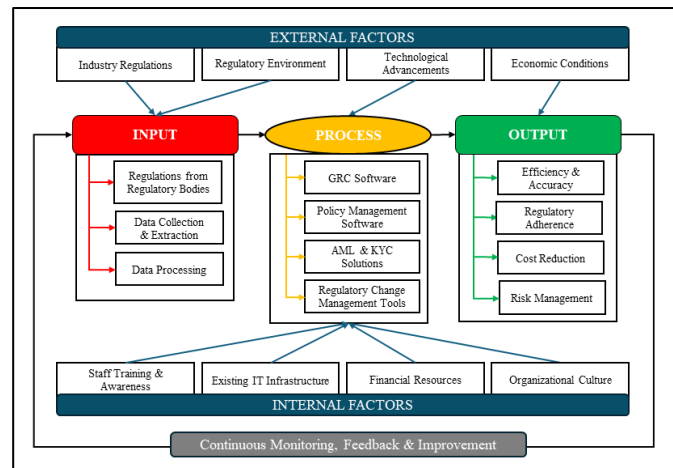


Fig. 10. RegTech Model

To optimize the bank's incorporation of RegTech technology, Figure 10 displays a RegTech Model. As it covers the intake, process, and output stages, it considers internal and external factors. When it comes to implementing RegTech solutions, there are a number of external issues that the bank cannot control. The laws of the Central Bank of Oman, the regulatory climate in Oman, technology developments, and economic circumstances are four important external elements that might impact the bank's operations and capacity to apply innovative solutions. A number of things that are under the control of the bank itself could affect how well RegTech integration goes. Organizational culture, available funds, personnel training and awareness, and the current IT infrastructure are the four main internal determinants. Examining the three steps in further detail reveals that gathering and processing regulatory requirements is the first stage. During the input stage, various tasks are performed, such as understanding and documenting regulatory requirements, collecting and extracting relevant data for compliance, and processing the data using advanced analytics and AI for proactive compliance measures and predictive risk modeling. This data is then made usable for compliance tools. Utilizing a variety of software solutions to oversee regulatory compliance is the next step in the process. It comprises GRC software, which manages and streamlines compliance tasks; policy management software, which updates policies in line with regulatory changes; AML and KYC solutions, which enhance due diligence by preventing money laundering and knowing your customer; and regulatory change management tools, which track and manage changes in regulations effectively. The last step is to analyze the results and rewards of using RegTech solutions. Efficiency, precision,

cost-cutting, and risk management are all a part of it. Constant assessment, feedback and enhancement ensure that the system is continually tracked, comments are regularly incorporated, and enhancements are implemented to fully use RegTech solutions. The Bank may strengthen regulatory compliance, align with Oman Vision 2040, and achieve sustained operational development by adhering to this framework and effectively integrating RegTech solutions.

XI. LIMITATIONS OF THE RESEARCH

While every attempt is made to gather comprehensive data, the study's findings are based on what is publicly accessible within the bank's jurisdiction. Inaccessible private or sensitive data limits the scope of some analysis. While the study's findings are helpful for the private bank under study, it is possible that other banks may not be able to use them or that they will not be widely applicable. Banks differ in organizational structures, regulatory frameworks, technological infrastructures, etc., hence the study's results may not be generalizable. It is possible that this study does not fully represent the long-term consequences and shifting patterns of RegTech since it is a cross-sectional study.

XII. FUTURE RESEARCH DIRECTIONS

- **Longitudinal research on RegTech implementation:** Longitudinal studies are necessary to ascertain the long-term effects of RegTech solutions on banking compliance and operational efficiency.
- **Comparative analysis between banks:** Analyzing the performance of RegTech solutions used by different institutions in Oman and the surrounding area, such the GCC, might help identify successful strategies and common challenges.
- **New technology impact:** Examine the possible improvements that RegTech solutions might encounter as a consequence of integrating new technologies, such as blockchain and artificial intelligence.
- **Customer impact analysis:** By analyzing this data, academics in the future will be able to ascertain how RegTech adoption affects consumer experiences and satisfaction in the banking sector.

XIII. ACKNOWLEDGEMENTS

We express our gratitude to Almighty God for bestowing upon us the wisdom to launch and carry out this study. Heartfelt appreciation goes to our families for their constant encouragement and contribution of essential resources during the endeavor. We convey sincere gratitude to our friends and colleagues for their support and valuable suggestions, which enabled us to examine the topic from several perspectives. We express heartfelt thanks to Middle East College for providing us with the essential resources required to carry out and complete this study. Additionally, we would like to convey our appreciation to the heads and faculty members of the

Department of Management Studies and Department of Computing and Electronic Engineering for their support, as their guidance and resources were invaluable in preparing this project. We extend our deepest gratitude to the private bank in Oman for providing us with the opportunity to work on a real-time project and gather first-hand information by means of interviews and questionnaires, which enhanced the groundwork of our study.

REFERENCES

- [1] B. Charoenwong, Z. T. Kowaleski, A. Kwan, and A. G. Sutherland, "RegTech: Technology-driven compliance and its effects on profitability, operations, and market structure," *Journal of Financial Economics*, vol. 154, p. 103792, Apr. 2024, doi: 10.1016/j.jfineco.2024.103792.
- [2] "Hardware & Software IT Services/ RegTech Market," Fortune Business Insights, 2024. [Online]. Available: <https://www.fortunebusinessinsights.com/regtech-market-108305>. [Accessed: April 11, 2024].
- [3] J. Li, A. Maiti, and J. Fei, "Features and Scope of Regulatory Technologies: Challenges and Opportunities with Industrial Internet of Things," *Future Internet*, vol. 15, no. 8, p. 256, Jul. 2023, doi: 10.3390/fi15080256.
- [4] G. Kukreja, R. Gupta, and A. Gupta, "Fintech in Oman: present and future scenario," in *Studies in Computational Intelligence*, 2021, pp. 173–183. doi: 10.1007/978-3-030-72080-3_10.
- [5] E. Z. Milian, M. De M Spinola, and M. M. De Carvalho, "FinTechs: A literature review and research agenda," *Electronic Commerce Research and Applications*, vol. 34, p. 100833, Mar. 2019, doi: 10.1016/j.elerap.2019.100833.
- [6] N. A. A. Udo, "REGULATORY COMPLIANCE AND ACCESS TO FINANCE: IMPLICATIONS FOR BUSINESS GROWTH IN DEVELOPING ECONOMIES," *Scientia Journal of Education Humanities and Social Sciences*, vol. 1, no. 2, pp. 8–23, Feb. 2024, doi: 10.62536/sjehss.2023.v1.i2.pp8-23.
- [7] "Regulatory technology (RegTech)- Navigating the right technology to manage the evolving regulatory environment," Ernst & Young Global Limited, 2019. [Online]. Available: https://assets.ey.com/content/dam/ey-sites/ey-com/en_us/topics/financial-services/ey-regulatory-technology-regtech.pdf. [Accessed: April 23, 2024].
- [8] O. Zawacki-Richter, V. I. Marín, M. Bond, and F. Gouverneur, "Systematic review of research on artificial intelligence applications in higher education – where are the educators?," *International Journal of Educational Technology in Higher Education*, vol. 16, no. 1, Oct. 2019, doi: 10.1186/s41239-019-0171-0.
- [9] T. Butler and L. O'Brien, "Understanding RegTech for digital Regulatory Compliance," in *Palgrave Studies in Digital Business & Enabling Technologies*, 2018, pp. 85–102. doi: 10.1007/978-3-030-02330-0_6.
- [10] M. Turki, A. Hamdan, R. T. Cummings, A. Sarea, M. Karolak, and M. Anasweh, "The regulatory technology 'RegTech' and money laundering prevention in Islamic and conventional banking industry," *Heliyon*, vol. 6, no. 10, p. e04949, Oct. 2020, doi: 10.1016/j.heliyon.2020.e04949.
- [11] J. Von Solms, "Integrating Regulatory Technology (RegTech) into the digital transformation of a bank Treasury," *Journal of Banking Regulation*, vol. 22, no. 3, pp. 191–207, Oct. 2020, doi: 10.1057/s41261-020-00138-w.
- [12] "Regulatory Framework," *Central Bank of Oman*, 2024. [Online]. Available: <https://cbo.gov.om/Pages/RegulatoryFramework.aspx>. [Accessed: May 12, 2024].
- [13] S. C. Rambaud and A. E. Gázquez, "A RegTech approach to fintech sustainability: The case of Spain," *European Journal of Risk Regulation*, vol. 13, no. 2, pp. 333–349, Jan. 2022, doi: 10.1017/err.2021.62.
- [14] F. Teichmann, S. Boticiu, and B. S. Sergi, "RegTech – Potential benefits and challenges for businesses," *Technology in Society*, vol. 72, p. 102150, Feb. 2023, doi: 10.1016/j.techsoc.2022.102150.
- [15] X. Chao, Q. Ran, J. Chen, T. Li, Q. Qian, and D. Ergu, "Regulatory technology (Reg-Tech) in financial stability supervision: Taxonomy, key methods, applications and future directions," *International Review of Financial Analysis*, vol. 80, p. 102023, Mar. 2022, doi: 10.1016/j.irfa.2022.102023.
- [16] N. O. Olawale, N. F. A. Ajayi, N. C. A. Udeh, and N. O. A. Odejide, "RegTech innovations streamlining compliance, reducing costs in the

- financial sector,” *GSC Advanced Research and Reviews*, vol. 19, no. 1, pp. 114–131, Apr. 2024, doi: 10.30574/gscarr.2024.19.1.0146.
- [17] Y. H. Al-Mamary, M. Al-Nashmi, Y. A. G. Hassan, and A. Shamsuddin, “A critical review of models and theories in field of individual acceptance of technology,” *International Journal of Hybrid Information Technology*, vol. 9, no. 6, pp. 143–158, Jun. 2016, doi: 10.14257/ijhit.2016.9.6.13.
- [18] G. C. Feng, X. Su, Z. Lin, Y. He, N. Luo, and Y. Zhang, “Determinants of Technology Acceptance: Two Model-Based Meta-Analytic Reviews,” *Journalism & Mass Communication Quarterly*, vol. 98, no. 1, pp. 83–104, Sep. 2020, doi: 10.1177/1077699020952400.
- [19] M. Mkhonto and T. Zuva, “Technology Acceptance: A Critical Review of Technology Adoption Theories and Models,” in *Lecture Notes in Networks and Systems*, 2024, pp. 414–428. doi: 10.1007/978-3-031-54813-0_38.
- [20] V. Venkatesh, M. G. Morris, G. B. Davis, and F. D. Davis, “User acceptance of information technology: toward a unified view,” Sep. 01, 2003. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3375136.
- [21] V. Venkatesh, S. A. Brown, and H. Bala, “Bridging the Qualitative-Quantitative Divide: Guidelines for conducting mixed methods research in information systems,” *Management Information Systems Quarterly*, vol. 37, no. 1, pp. 21–54, Jan. 2013, doi: 10.25300/misq/2013/37.1.02.
- [22] M. Saunders, P. Lewis, and A. Thornhill, “*Research Methods for Business Students*”, 7th ed. Essex: Pearson Education Limited, 2016.
- [23] K. S. Taber, “The use of Cronbach’s Alpha when developing and reporting research instruments in science education,” *Research in Science Education*, vol. 48, no. 6, pp. 1273–1296, Jun. 2017, doi: 10.1007/s11165-016-9602-2.
- [24] A. A. Sultan, A. O. Abdelmoneium, J. G. Grzywacz, and P. Hong, “The balance between work and family among Omani female workers: experiences and challenges,” *DIFI Family Research and Proceedings*, vol. 2023, no. 1, May 2023, doi: 10.5339/difi.2023.2.
- [25] L. Barrington, “Oman extends Omanisation by giving locals higher education jobs,” Reuters, Feb. 14, 2021. [Online]. Available: <https://www.reuters.com/article/idUSKBN2AE0PM/>. [Accessed: May 07, 2024].
- [26] S. A. Musalmy, “*Omanisation gathers steam*,” Muscat Daily, Nov. 16, 2022. [Online]. Available: <https://www.muscatdaily.com/2022/11/16/omanisation-gathers-steam-2/>. [Accessed: May 10, 2024].
- [27] J. McCarthy, “The regulation of RegTech and SupTech in finance: ensuring consistency in principle and in practice,” *Journal of Financial Regulation and Compliance*, vol. 31, no. 2, pp. 186–199, Jul. 2022, doi: 10.1108/jfrc-01-2022-0004.
- [28] C. Andrade, “The P value and statistical significance: misunderstandings, explanations, challenges, and alternatives,” *Indian Journal of Psychological Medicine*, vol. 41, no. 3, pp. 210–215, May 2019, doi: 10.4103/ijpsym.ijpsym_193_19.