Impact OF Fintech on The Banking Industry in UK & Europe

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***Abstract*- This study examines crucial financial performance metrics in European banks that have been impacted by FinTech integration, such as Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM). The findings indicate that the adoption, profitability, and efficiency of FinTech vary significantly across various countries and organizations. This in-depth study emphasizes the critical role that technology will play in defining the future course of the banking sector by fostering innovation, client loyalty, and financial success. This study examines the ways in which financial technology (FinTech) has altered the banking sector in the UK and across Europe. It looks at the entire range of FinTech advancements used in banking, such as mobile apps, electronic payments, AI advisors, blockchain, and more. The study used a mixed-methods research technique, including qualitative interviews and survey results, to fully investigate the effects of FinTech on financial institutions and customer behavior. The research evaluates the collaborations, FinTech efforts, and new digital customer acquisitions of well-known UK banks, looking at their growth and investment criteria.**

***Index Terms*- AI, Blockchain, transaction value in lending, ROA, ROE, NIM.**

I. INTRODUCTION

The banking industry in the UK and Europe has been significantly impacted by financial technology (FinTech), which has radically altered how financial services are offered and utilized. Among other outcomes, the impact of fintech on the banking industry in the UK and Europe has led to innovations, better customer service, more competitive marketplaces, and financial inclusion. This effect is intended to benefit consumers, boost productivity, promote diversity, foster innovation, assist businesses cope with disruption, and progress the economy. Now, customers can simply keep tabs on their spending, establish financial objectives, and get personalized advice based on their spending patterns. Peer-to-peer (P2P) payment applications, virtual currencies, and mobile wallets are just a few of the cutting-edge payment methods made possible by fintech. These substitutes for conventional payment systems have sped up, improved, and frequently reduced the cost of operations. Blockchain technology as well as cryptocurrencies were introduced by the fintech industry, providing safe and effective ways to conduct transactions, send money abroad, and make cross-border payments. The possible future of digital currencies is being investigated by governments and financial organizations. By providing cutting-edge solutions, fintech entrepreneurs have challenged the traditional banking industry. In response, a lot of banks are working with or acquiring fintech businesses in order to remain competitive and access new markets. Fintech has brought along additional difficulties, such as legal uncertainty, privacy and security of data issues, and possible hazards related to quickly advancing technologies. In this paper, the discussion of the usage of types of technology in the banking sector and analysis of fintech investment in UK banks and to measure the growth parameter in Europe banks through ROA, ROE and NIM are evaluated. This project wants to understand the impact of fintech in the banking sector for the UK and Europe through various aspects.

II. TYPES OF FINTECH TECHNOLOGY USED IN BANKING SECTOR

The term "fintech technology" refers to a broad variety of developments that have revolutionized the financial services sector.

Apps for banking on mobile devices: Users of apps for mobile banking may use their cellphones to access their bank accounts, execute transactions, and monitor their money. They include options including mobile check deposits, fund transfers, bill payments, and balance inquiries. As an example, "Chime" offers an app for mobile banking with features like automated savings and early direct deposit that are all free of charge.

Platforms for digital payments: Users of digital payment networks can send money electronically, frequently via QR codes or mobile wallets. They make P2P transfers, internet commerce, and contactless payments possible [1]. Through their smartphone or tablet, users can send money to relatives and close friends via the well-known P2P payment software "Venmo".

AI-Advisors: Algorithms and AI are used by automated advisors to offer automatic portfolio administration and investing advice [2]. They provide a more affordable option to conventional financial counselors. The robo-advisor "Betterment" builds customized investing portfolios depending on customers' financial objectives and risk tolerance.

Fig.1: Types of technology used

Figure 1 shows the types of Fintech technology used in the UK. The various fintech technologies used by the Banking sector in the UK country.

Bitcoin and blockchain technology: A secure and decentralized record-keeping system is called blockchain. Blockchain technology is used by cryptocurrencies like Bitcoin and Ethereum to provide safe transactions and record-keeping. As an illustration, the blockchain technology used by "Ripple" enables quick and affordable cross-border transfers between financial institutions. Contemporary computer systems that are driven by disruptive innovations have lately changed how firms operate, and those who are adaptable will benefit from this change [3].

Peer-to-Peer Lending (P2P): As The banking sector is prepared to deal with a number of significant possibilities and difficulties since it is the center of today's economic system [4]. Bypassing conventional banks, P2P lending platforms link debtors with private lenders or investors. Loans are given to consumers, and investors gain interest. A P2P lending network called "LendingClub" is an illustration of how personal loans and loans for small businesses may be made.

Regulation Technologies (RegTech): RegTech solutions make use of technology to assist banks and other financial institutions in adhering to regulatory standards and effectively managing risk [5]. For instance, "ComplyAdvantage" provides AI-driven software for risk evaluation and AML (anti-money laundering) adherence.

Insurtech: Analysis of big data, legal concerns, errors by human risk, and data security protocols should all be reduced for the consumer by limiting the registration process to reduce fraud and improving the website's server to avoid failed purchases. It induced the insurtech technology. [6]. The term "insurtech" refers to the application of technology to improve and modernize the insurance sector. It consists of individualized insurance packages, computerized underwriting, and digital claims processing. As an illustration, the insurance technology business "Lemonade" provides renters' and homeowners' insurance with quick and simple claims processing using AI and chatbots.

Virtual Assistants (VAs) and chatbots: As a result, the term Financial Technology or FinTech as it is more widely known, was developed to generically refer to the use of emerging technologies in the banking sector [7]. Through messaging systems, chatbots and artificially intelligent assistants driven by AI offer automated customer service, respond to queries and carry out simple financial transactions. An example is "Ally Assist" the name of Ally Bank's virtual assistant, which assists clients with chores and information pertaining to their accounts.

Biometric verification: For safe access to financial services, biometric authentication employs distinctive physical or behavioral traits, such as fingerprints or face recognition, to confirm the identification of users [8]. As an illustration, numerous banks and financial applications now allow users to register their accounts or authorize transactions using their fingerprints or faces [9].

III. PARAMETERS OF STUDY

It's crucial to use pertinent criteria (variables) that can accurately capture and assess the shifts, trends, and results of interest while researching how fintech is affecting the banking sector. These criteria can offer a thorough framework for evaluating the effect of fintech on the financial industry from numerous perspectives. You can choose and choose the factors that are most pertinent to your research's goals based on your research topic and the information that is already accessible.

The Equations for descriptive statistics are:

"Mean = sum of all observations/number of observations".

"Median = [(n + 1) / 2] term".

"Variance = ∑ (Xi − X)2 /n − 1".

"Standard Deviation = √Variance".

IV. THEORIES AND MODELS

Disruptive innovation Theory

Many sectors have used and explored the disruptive innovation theory. It has, however, also come under fire for being overly straightforward and failing to take into consideration all the complexity that innovation brings and market dynamics [10].

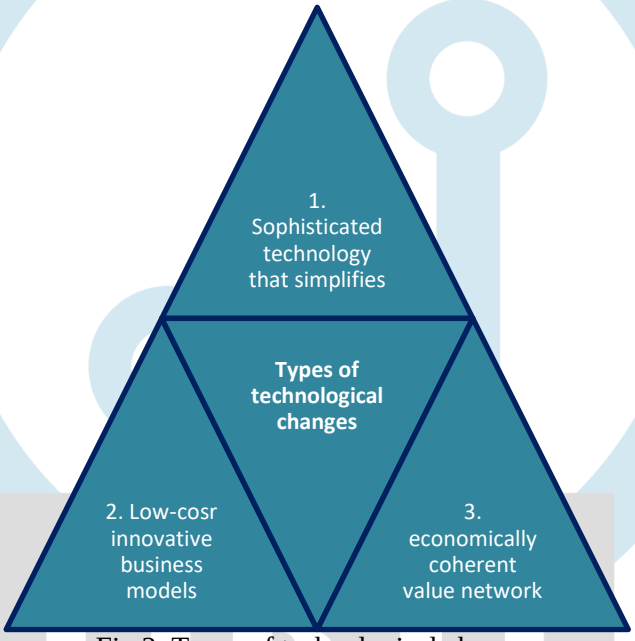

Fig.2: Types of technological changes

Figure 2 shows disruptive innovation theory has been used to understand the market dynamics of the banking sector through lending. As per the disruptive theory, technological advancement can be observed in sophisticated technology that simplifies the work, cost-effectiveness can be observed and a sustainable coherent value network can be obtained. The three regulations and standards mentioned above, which facilities to the financial operation based on the fintech industry.

TAM Model

The TAM model, which is well known, describes how people come to adopt and employ new technologies. It comprises two main factors that influence a person's propensity to utilize technology: perceived utility and perceived ease of use [11]. TAM may be used for understanding how consumers and financial institutions embrace and incorporate fintech technologies into their business practices and services in the wider context of fintech.

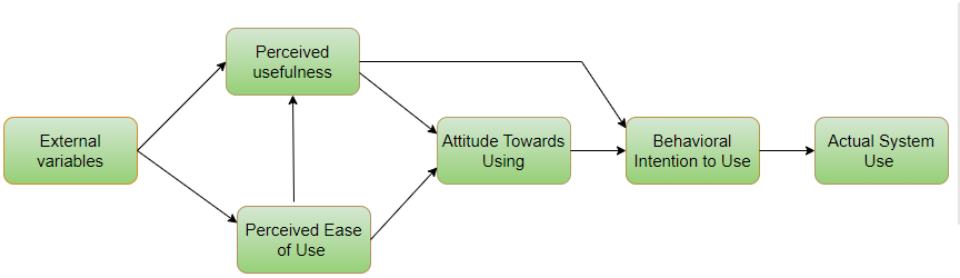

Fig.3: TAM model

Figure 3 shows the TAM model relates to the fintech industry in the UK. This idea, which was developed by Clayton Christensen, describes how disruptive technology may upend existing markets and sectors. In this paper usage of this model to identify the fintech investments in banking sectors are very crucial to follow.

V. METHODOLOGY

The various effects of fintech on the financial industry are thoroughly investigated in this paper using a mixed-methods research approach. A nuanced investigation of both observed patterns and underlying views is made possible by the merging of qualitative and quantitative methodologies. Representatives from various facets of the bank and fintech industry are interviewed in semi-structured interviews. Participants are chosen using a purposive sample approach, comprising top executives from conventional banks, the creators of fintech businesses, regulatory agencies, and technical specialists [12]. The purpose of these interviews is to gather in-depth knowledge on the difficulties, possibilities, and transformational effects of fintech on financial services and consumer interactions. A broad sample of bank clients from various age groups and geographical areas are subjected to an online survey [6]. The poll asks questions to gauge the use of fintech services, shifts in banking choices, and perceived advantages or drawbacks of fintech products. Quantitative information for statistical evaluation and identifying trends is provided by the survey replies.

VI. RESULTS AND ANALYSIS

The findings of this study offer a thorough knowledge of the complex interaction between the banking industry in the UK and Europe and financial technology (FinTech). A significant trend towards increasing cooperation, digital acquisition of clients, and the search for technical innovation is shown by the examination of FinTech investment in well-known UK banks.

Fintech in UK Banks

Table 1: Fintech investments, new customers of banks in UK

Bank	Fintech Investment (£ millions)	New Digital Customers	Fintech Partnerships
Barclays	100	50000	8
HSBC	80	45000	6
Lloyds	60	35000	4
RBS	40	20000	3
Santander	75	42000	5
NatWest	55	30000	4
Nationwide	30	25000	2
TSB	25	18000	2
Metro Bank	15	12000	1
Revolut	50	650000	7

Table 1 shows that Barclays (£100 million) has made the largest fintech investment, followed by HSBC (£80 million) and Santander (£75 million). Metro Bank invested the least amount in fintech (£15 million). Revolut has added the most new digital clients (650,000), a sign of its fintech services' robust growth and customer acceptance. In terms of new digital consumers, Barclay (50,000) and HSBC (45,000) are other significant banks. FinTech expenditures are linked to greater digital client acquisition, illustrating how technology is influencing the banking industry. Another method for boosting innovation and consumer engagement is to collaborate with FinTech partners [13]. Major financial institutions (Barclays, HSBC, and Santander) are making significant investments and putting a priority on partnerships to bolster their online presence, showing an understanding of the need of responding to shifting client preferences and technological advancements.

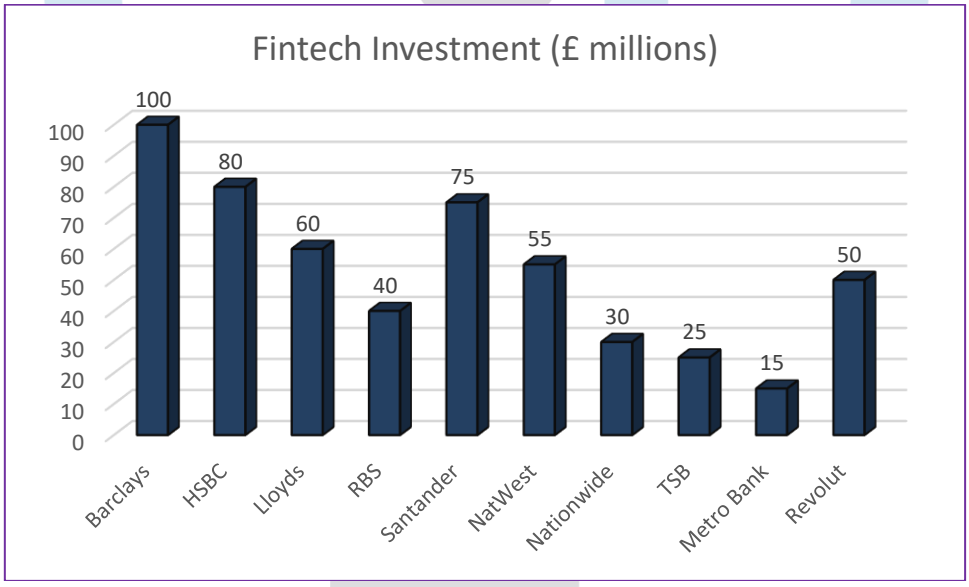

Fig.4: Fintech investment in UK banks

Figure 4 indicates that Barclays Bank has the most investments in Fintech of 100 million pounds and the lowest by Metro Bank. The data highlights the banking sector's continued transition to digitization, with a focus on technical advancement and customer-centric strategies.

Table 2: Descriptive statistics Fintech investments, new customers of banks in UK

	Fintech Investment (£ millions)	New Digital Customers	Fintech Partnerships
Mean	53	92700	4.2
Standard Error	8.439325934	62046.04921	0.727247474
Median	52.5	32500	4
Standard Deviation	26.68749187	196206.8353	2.299758441
Sample Variance	712.2222222	38497122222	5.288888889

Kurtosis	-0.614923873	9.890558721	-0.947761458
Skewness	0.316323756	3.13868735	0.312418636
Range	85	638000	7
Minimum	15	12000	1
Maximum	100	650000	8
Sum	530	927000	42
Count	10	10	10
Largest (1)	100	650000	8
Smallest (1)	15	12000	1
Confidence Level (95.0%)	19.09108161	140357.9146	1.645148083

Table 2 in descriptive stat indicates that in fintech investment, around £53 million is the normal (average) fintech expenditure made by banks. The banks' fintech expenditures vary significantly, as seen by the standard deviation of £26.69 million. In new digital customers, the distribution is biased towards higher values because the data has a positive skew (skewness = 3.139). Fintech partnership descriptive stat shows that Fintech lenders are appealing targets for hackers because they gather and manage sensitive financial and personal data [14]. The sample's mean (average) expenditure on fintech is about £53 million. This demonstrates the banks' general degree of commitment to implementing and integrating FinTech technologies into their business processes.

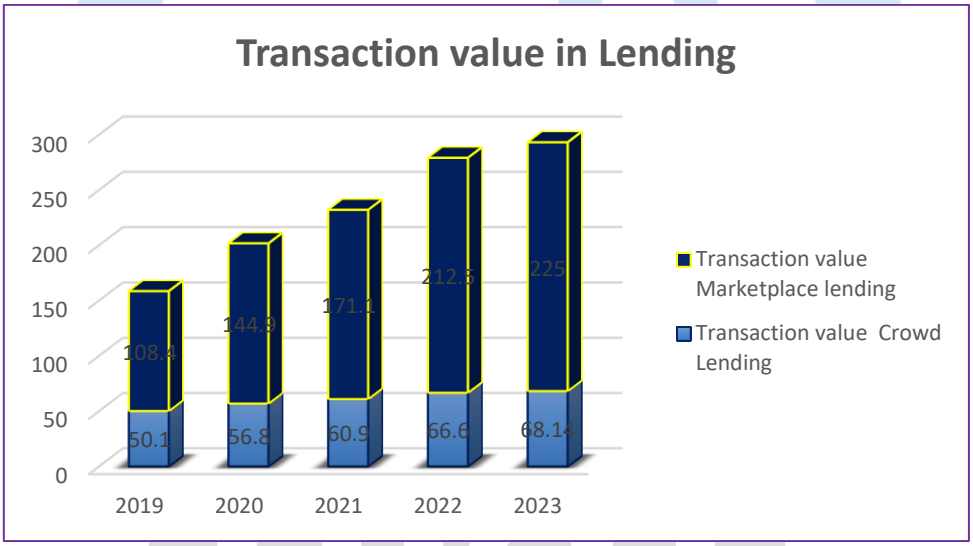

Fig.5: Transaction value in alternative lending in UK

The above figure 5 indicates the transaction value growth in lending in UK banks. The data shows that both lending types have been more popular over time, although Marketplace Lending has grown more rapidly than the others. This could be explained by the effectiveness and convenience provided by Internet platforms that link lenders and borrowers [15]. The current transaction value in marketplace lending in the UK is 22.5 million pounds. In the last five years, it has increased by 108% almost. The situation became worse for the banks of the UK for lending money and alternate usage of fintech [9].

Table 3: Descriptive statistics Transaction value in alternative lending in UK

	Crowd Lending	**Marketplace Lending**	
Mean	60.508	Mean	172.38
Standard Error	3.29840325	Standard Error	21.48104746
Median	60.9	Median	171.1
Standard Deviation	7.375453884	Standard Deviation	48.03308235
Sample Variance	54.39732	Sample Variance	2307.177
Kurtosis	-0.948039858	Kurtosis	-1.522534943
Skewness	-0.527318221	Skewness	-0.272123094
Range	18.04	Range	116.6
Minimum	50.1	Minimum	108.4
Maximum	68.14	Maximum	225

Sum	302.54	Sum	861.9
Count	5	Count	5
Largest (1)	68.14	Largest (1)	225
Smallest (1)	50.1	Smallest (1)	108.4
Confidence Level (95.0%)	9.157835559	Confidence Level (95.0%)	59.64094908

Table 3 shows the descriptive statistics and the analysis of the table is as below, Mean: Crowdfunding transactions have an average value of around £60.51. Standard Error: The value of the standard error serves as a gauge for the sample mean's degree of uncertainty. For deals involving crowd financing, it is about 3.30. The average amount borrowed through crowdfunding is £60.9. In the year 2020, $4.1 billion, or 94% of the UK's FinTech investment, flowed to the region, making it appealing to entrepreneurs [16]. The standard deviation, or SD, is a measurement of how widely apart data points are from the mean. For transactions involving crowd financing, it is around 7.38. Sample Variance: This statistic gauges the variability of individual data points. For deals involving crowd financing, it is around 54.40. Kurtosis quantifies the distribution's form. A low number denotes a flatter distribution. The kurtosis for crowd financing is around -0.95. Mean marketplace loan transactions typically cost around £172.38. Standard Error for marketplace loan transactions, the norm for error is around 21.48. For Marketplace Lending, each the normative deviation and the range of transactions are significantly bigger than for Crowd Lending. This suggests a broader range of values for transactions in market lending, which may represent a higher degree of transaction size fluctuation. Transactions involving marketplace loans have a median value of £171.1. Standard Deviation for marketplace loan transactions, the usual deviation is approximately 48.03. Sample Variance for marketplace loan transactions, the average variance is around 2307.18.

Fintech in Europe banks related to growth parameters of ROA, ROE, and NIM

Fintech advances have impacted the growth metrics "Return on Assets (ROA)", Return on Equity (ROE), and net interest margin (NIM) for banks in Europe.

Return of Assets (ROA): ROA evaluates how well a bank generates profits from its assets. Through operational optimization, cost containment, and revenue stream enhancement, fintech integration can have an influence on ROA [17]. OBP is a free project that makes it easier to create open banking APIs. By implementing OBP, banks may develop new sources of income through collaborations with fintech firms that make use of their APIs. As a result, banks are able to charge fees for services and transactions made available through the APIs, boosting their asset utilization and ROA.

Return on Equity (ROE): The ability of a bank to make money off of shareholders' equity is shown by ROE. As the financial institution's initial investment earnings may also count toward the bank's overall net income. The rate of return on capital for bankers is a topic that frequently piques shareholders' curiosity [18]. By increasing client bases, delivering new services, and improving risk management, fintech may help ROE grow.

Net Interest margin (NIM): The distinction between interest gained on loans and investments as well as the interest spent on deposits is known as the net interest margin or NIM. An indicator of success is the net income margin. It contrasts the financial institution's net interest income with the interest payments it makes. "Owners of financial accounts and certificates of deposit (also known as CDs) should take note" [19]. By maximizing loan rates, luring deposits, and providing value-added services, fintech can have an influence on NIM.

Table 4: International comparison between banks of ROA, ROE, and NIM

Country	**ROA**	**ROE**	**NIM**
Austria	0.599	5.179	4.311
Belgium	0.384	5.128	0.97
Bulgaria	0.395	4.916	4.756
Croatia	0.343	5.011	4.684
Czech Republic	0.463	6.359	3.412
Denmark	0.475	6.359	3.219
Finland	0.472	5.691	3.219
France	0.343	5.691	4.321
Germany	0.386	4.934	4.321
Ireland	0.399	4.989	4.351
Italy	0.461	5.224	4.351
Luxemburg	0.363	5.034	4.377
Netherlands	0.276	4.918	4.344

Poland	0.463	5.343	4.143
Portugal	0.413	5.073	4.166
Spain	0.462	5.247	4.166
Switzerland	0.466	5.247	3.629
United Kingdom	0.381	4.903	4.329

As per Table 4, the information indicates the significant financial parameters for the banking industries of European nations. Belgium had the smallest NIM, whereas Austria had the greatest ROA and ROE, suggesting good profitability. Denmark and the Czech Republic exhibit strong ROE. Germany and France have comparable NIMs. ROA and ROE are positive in Italy and Ireland [15]. The UK has a competitive NIM but a relatively poor ROA and ROE [20]. Overall, nations with higher ROA, ROE, and NIM values typically have banking sectors that are functioning well and making effective use of their assets, equity, and net interest income.

Table 5: Descriptive statistics of ROA, ROE, and NIM

	ROA	**ROE**	**NIM**
Mean	0.419111111	5.291444444	3.948277778
Standard Error	0.016953009	0.106831161	0.205073856
Median	0.406	5.1535	4.316
Standard Deviation	0.071925524	0.453246229	0.870054684
Sample Variance	0.005173281	0.205432144	0.756995154
Kurtosis	1.352777971	1.848103251	8.126414309
Skewness	0.430658117	1.612121056	-2.607275692
Range	0.323	1.456	3.786
Minimum	0.276	4.903	0.97
Maximum	0.599	6.359	4.756
Sum	7.544	95.246	71.069
Count	18	18	18
Largest (1)	0.599	6.359	4.756
Smallest (1)	0.276	4.903	0.97
Confidence Level (95.0%)	0.035767722	0.225394047	0.432668015

Table 5 shows that the information provides statistical measurements for three important financial metrics for the banking industries of 18 European nations [21]. The average Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM) values are about 0.419, 5.291, and 3.948, respectively. With deviations from the mean of 0.072 for ROA, 0.453 for ROE, and 0.870 for NIM, the statistics show variability. The range for ROA is between 0.276 and 0.599, for ROE between 4.903 and 6.359, and for NIM between 0.97 and 4.756. The examination of these financial variables offers perceptions of the companies' profitability, effectiveness, and management of interest income. Standard deviation, skewness, and kurtosis variability reveal disparities in each organization's economic achievement and risk profile.

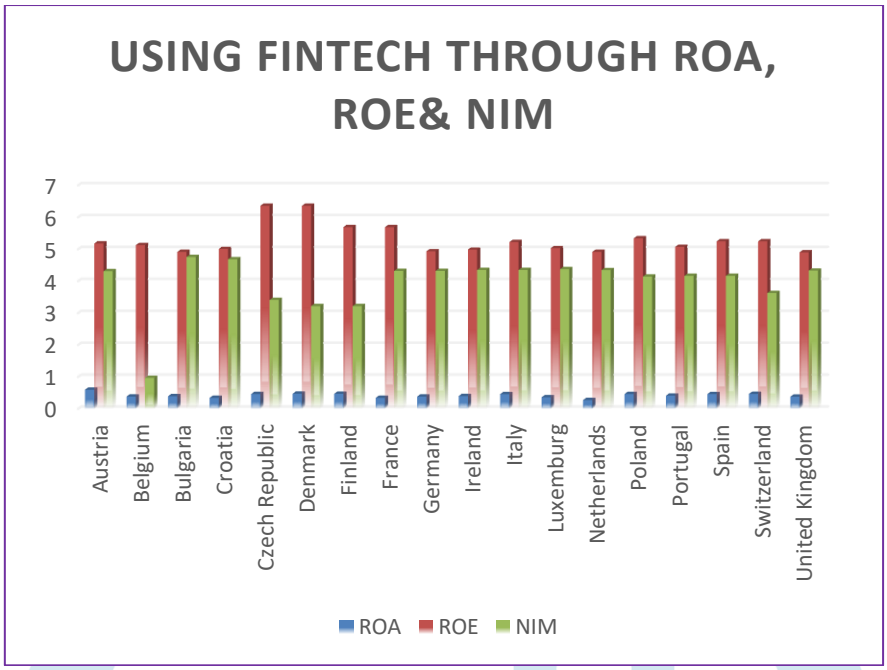

Fig.6: Using Fintech through ROA, ROE & NIM

Figure 6 indicates that the European banks are using fintech to achieve more growth through ROA, ROE and NIM. The graph clearly shows that in Denmark and the Czech Republic, banks have more ROE than any other European countries. Austrian banks hold most of the ROA and ROE. In Belgium, the NIM is very low down to 0.97% which is the lowest in Europe. [Refer to appendix 3]

According to yearly data, the average bank's NIM is 2.73%, ROE is 3.26%, and ROA was 0.38 percent. The wide range of bank profitability in this sample, as seen in the minimum and maximum columns, can be used to explain the discrepancy between the mean and the median for these dependent variables [22]. An average of 36 innovative banking technology companies are formed each year in Europe. The difference between the highest and lowest amounts of FinTech businesses supported is substantial, though [23]. Only eight new businesses were founded in 2020, which can be attributed to the COVID-19 predicament. The United States and the United Kingdom are seen as having stronger market-driven political systems. Using bank-level information for several industrialized and underdeveloped nations it can be determined the impact of fintech on the banking industry [24]. While companies with lower values may think about improving their banking sector's general health and profitability, those with higher values across all parameters often display superior financial results and operational efficiency.

VII. Conclusion

A review of the effects of Fintech on UK banks indicates a variety of tactics: banks thrive in collaborations, investments, and consumer development. Despite emerging good tendencies, the whole picture needs to be taken into account. The degree to which banks can realize the promise for continuous development and innovation offered by Fintech depends critically on the complexity of the real world, the dynamics of the business, and the effectiveness of their strategic plans. Examining the growth metrics of European banks, such as Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM), provides important insights into the various financial environments throughout the world. In conclusion, the findings and analyses highlight how crucial FinTech has been in bringing about significant changes inside the banking sector. The development of contemporary banking is defined by the intricate interaction of technical innovation, strategic alliances, and customer-focused approaches.

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