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A STUDY ON DYNAMIC RELATIONSHIP BETWEEN AI AND CYBERSECURITY AND ITS IMPACT ON FINTECH

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Abstract: Due to the development of AI tools, financial service models, domains, and products surged to a greater extent. Financial domains in any field are looking forward to aggressive and integrated innovative software to face financial risks and challenges. Fintech emerged as a major player in the technology platform due to financial digitization and setting its standards and tools to consummate the meteoric gush of financial services. The cyber security integration with Fintech paves the way for the growth and challenges faced by Fintech companies. The integration of AI, cybersecurity, and fintech will enable businesses to face business interruptions and financial crimes. AI and cyber security associate to achieve unprecedented heights in financial crime. This paper clutches empirical evidence from secondary data sources and endeavors to comprehend the growth of fintech companies, AI contribution towards growth, and finally the role of cybersecurity to augment fintech solutions. The results of this study will lay out a pattern of bequests that integrate AI and cybersecurity for fintech companies. Based on the results, a model can be developed to provide guidance for future AI integrations.

Keywords: cyber security, AI, and financial crimes.

1. Introduction:

A new technological area that has emerged to advance and automate financial services is financial technology. The digital India concept has led to a massive rise in the fintech business in India. The development and investments of fintech enterprises reflect a turning point in the history of Indian financial services. The creation of AI-integrated fintech solutions aided in the expansion of the fintech industry. The Fintech market in India peaked in 2023 at 84%. Neo-banking, digital payments, insurance

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tech, investment tech, fintech as a service, and lending tech are the newest trends in the fintech business in India. When evaluating the different parts of the fintech market, the loan sector had a 14% gain in 2022 compared to 2024, but other sectors saw a funding slowdown. A shockwave was sent over the industry in June when the RBI forbade fintech companies without a banking license from offering credit lines in their prepaid payment instruments (PPIs). sending a shock wave across the digital lending ecosystem. Card-based fintech firms also stopped supporting their bank PPIs on these platforms after seeking clarification from the RBI. The initiatives taken by the government in the technology move from 5G to being the leader in 6G pave the way for the development of technology-based various sectors, especially fintech. The RBI issued digital lending guidelines to protect the borrower. AI in the financial sector can improve processes such as data automation, credit risk assessment, detecting banking fraud, increasing safety, automated customer service, analyzing user behavior, and financial forecasting. AI is playing an increasingly important role in cyber security, for both good and bad. But cybercriminals can also use the technology to launch more sophisticated attacks. Cyber security products and processes are being transformed by AI.

2. Recent research on Fintech, AI and cybersecurity

According to Mathur, H.2020: India’s FinTech companies are redefining the standards for the nation's financial services.

Aadhaar, Jan Dhan Yojana, and the introduction of UPI are just a few of the government initiatives that are supporting the fintech sector in India and laying a solid platform for increased financial inclusion. (https://www.financialexpress.com).

In terms of demographics, the percentage of men and women using Fintech applications was 88% and 84%, respectively. In terms of age, the group most likely to adopt FinTech’s is those between the ages of 25 and 44, where adoption rates are approximately 94% domestically and 73% worldwide. In this link: https://bfsi.economictimes.indiatimes.com

One of the Fintech markets with the fastest global growth rates is India. In terms of FinTech adoption rate, India came in first place internationally, followed by China. A $65 billion value of digital payments is anticipated in 2019.

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A 20% compound annual growth rate (CAGR) is anticipated for the $65 billion digital payments market by 2023.The URL is https://www.investindia.gov.in.

According to S.Adithya, 2019 :Global marketplaces are distinguished by a variety of criteria, and the Fintech industry is no exception. India distinguishes itself as a specific market for Fintech, particularly the payments community, with its own set of potential and problems.

Globally, new financial technology, or FinTech, have taken off. (Kavuri, A. S., & Milne, A. ,2018)

Fintech or Financial Technology refers to a firm merging the upcoming technological trends to provide better financial solutions to its clients in the form of digital payments and transactions (Saumya Uniyaland Aakriti Suri (,2020)

With each startup, the industry has now grown a great deal and is becoming well-known worldwide. These 20 Indian fintech businesses have been included among the 250 most promising startups worldwide, according to CB Insights' most recent reports (Wilson, R., 2020).

Fintech, at the same time, is growing rapidly. Many industries compete to provide services that support new developments and make it difficult for customers to switch between services, as seen in social networking sites and other websites that offer online services like Amazon (Wulan 2017.)

3. Objectives:

To assess the growth of Fintech companies

To ascertain AI contribution to Fintech

To understand the role of cybersecurity to augment fintech solutions

4. Analysis and Interpretation:

a) Growth and Investments in Fintech.

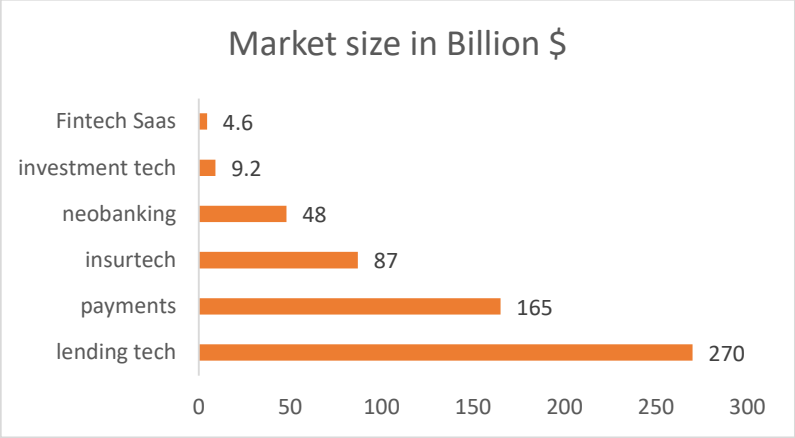
b) AI contribution to Fintech

e) Hypothesis
H1: Investments in lending tech and payments contribute for fintech investments
H 2: AI and cybersecurity on fintech positively correlated

a) Growth and Investments in Fintech

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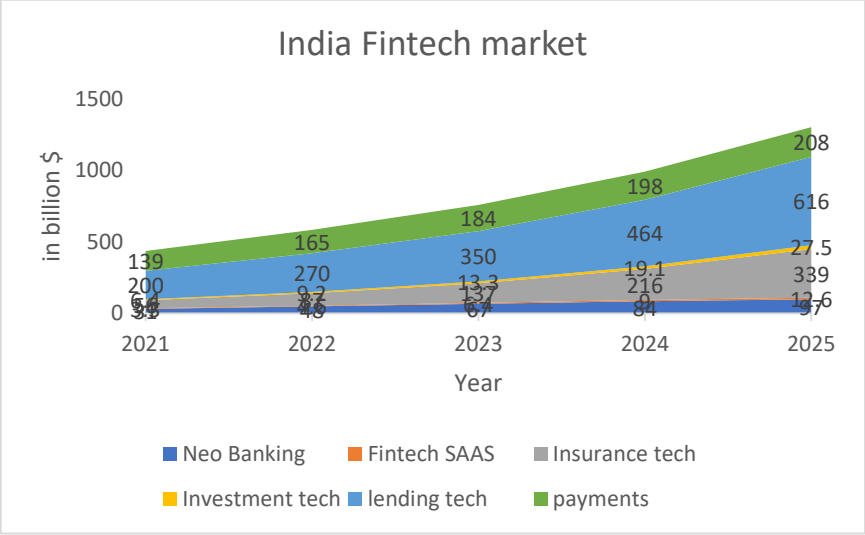
a.1) Fintech Segment wise market size in billion $



Source: Statista

The above chart shows fintech segment wise, the highest percentage was taken by lending tech 270 billion$ market size followed by payments 165 billion $, insurance tech 87 billion $ and another segment in bottom level.

a.2) Growth of India fintech market



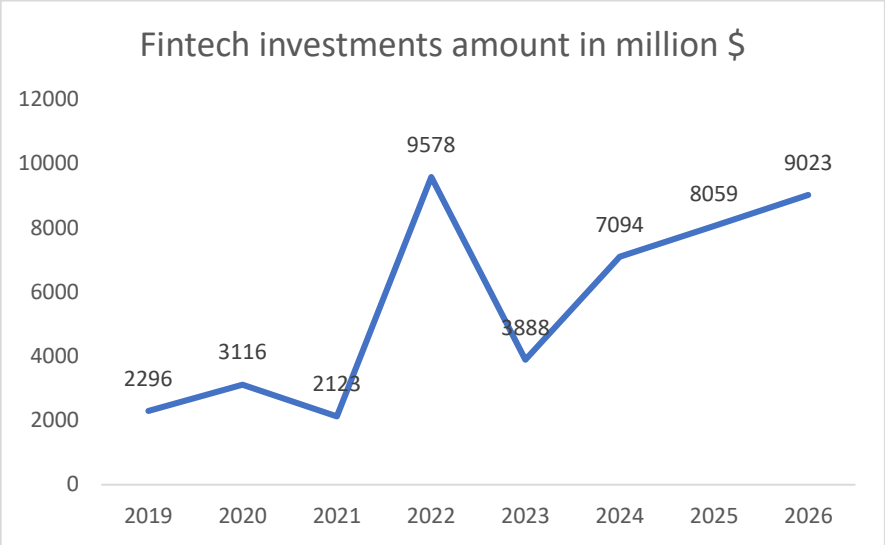
Source: Statista

The potential for the fintech industry in India is projected to reach $1.3 trillion by 2025, expanding at a 31% compound annual growth rate from 2021 to 2025. Lending technology is expected to make up 47% of this total ($616 billion), with insurance tech coming in second at 26% ($339 billion) and digital

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payments at 16% ($208 billion). With a compound annual growth rate (CAGR) of 57%, insurance tech is the fastest-growing fintech sub segment among these three. Fintech SaaS (40%), investment tech (44%), and investment tech are the next fastest-growing subsegments.

a.3) Fintech investments in India



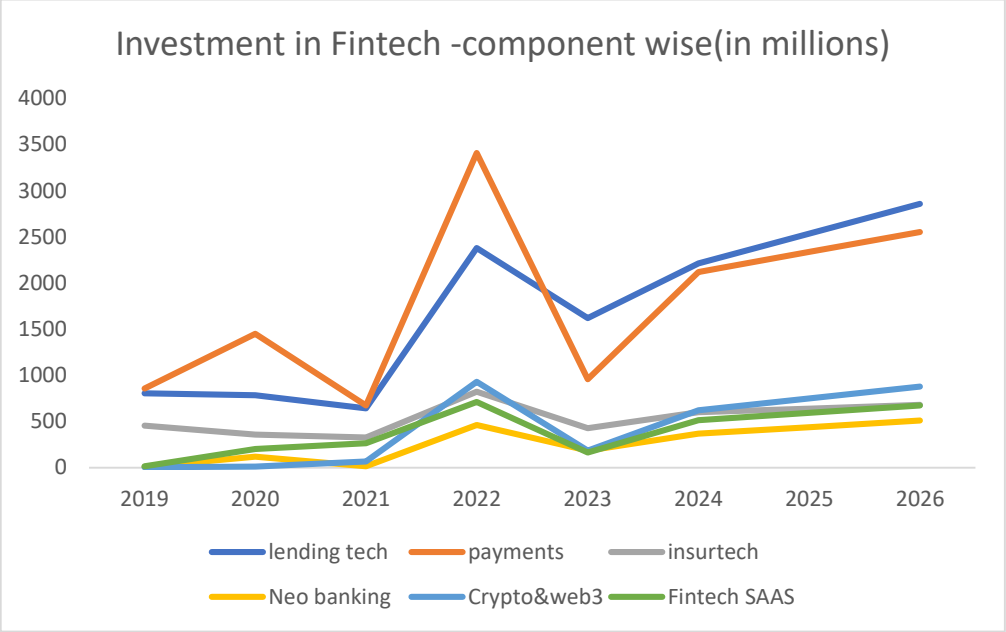
Source: RBIH April 2022-March 2023

During the fiscal year 2019 and 2023, PE-VC investors have over $21 billion was invested in Indian fintech businesses. • PE/VC investments were made in the fintech sector. Valued at $3.9 billion for the 2023 fiscal year. The difference between the investments made in 2022 ($9.5 billion) and 2023 ($3.9 billion) is substantial. The decline in investments can be attributed to a number of factors, including financial crime, RBI rules, and cyber security solutions with AI integration. The rebound from the investment slowdown brought on by in the majority of the sectors, financing winter was observed.

The analysis of this data in the context of trend prediction for 2024, 2025, and 2026 revealed a phase of recovery in fintech investments.

a.4) Investment in Fintech-Component wise

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Source: RBIH April 2022-March 2023

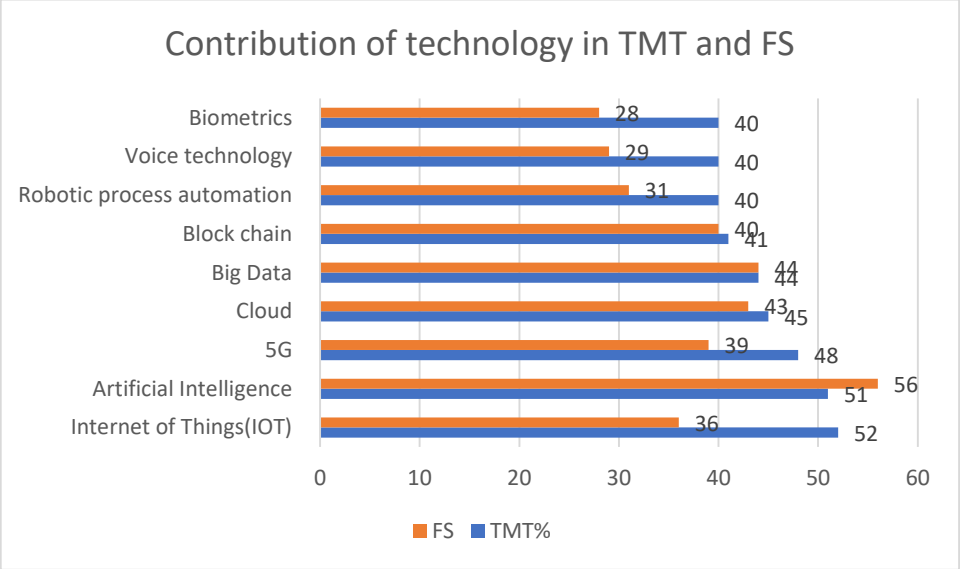
The investments in fintech are displayed in the above chart. It is evident from a component-by-component or sector-by-sector analysis that every component was in decline during FY 2023. For analysis conducted prior to 2023, assuming this year, payouts were greater for acquiring investments than for lending tech. The trend projection approach, which asserts that lending tech investments are larger than payments, was used to make the prediction after 2023. It can be said that compared to payment tech, the lending tech business draws more investments.

b) AI contribution to Fintech

b.1) Contribution of technology in TMT (Technology Media and Telecommunications)

and FS (Financial services)

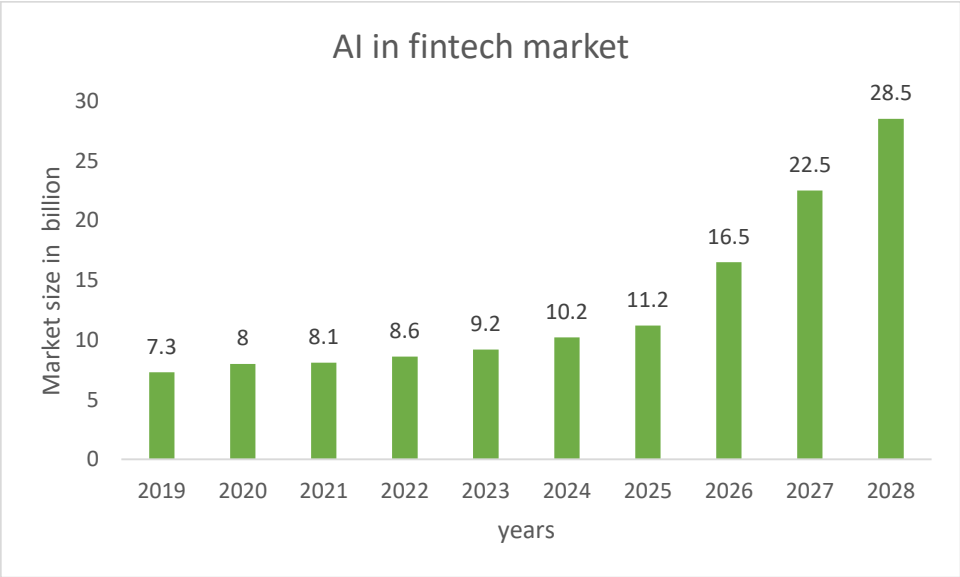
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PwC Global Fintech Survey

The above chart illustrates how artificial intelligence (AI) technology provides 56% to Financial services: blockchain (40%), big data (44%), and cloud (43%). The most recent technology Financial ideas and innovations interact to provide a financial sector through which integration results in the growth of both industries overall.

b.2) AI in Fintech market size

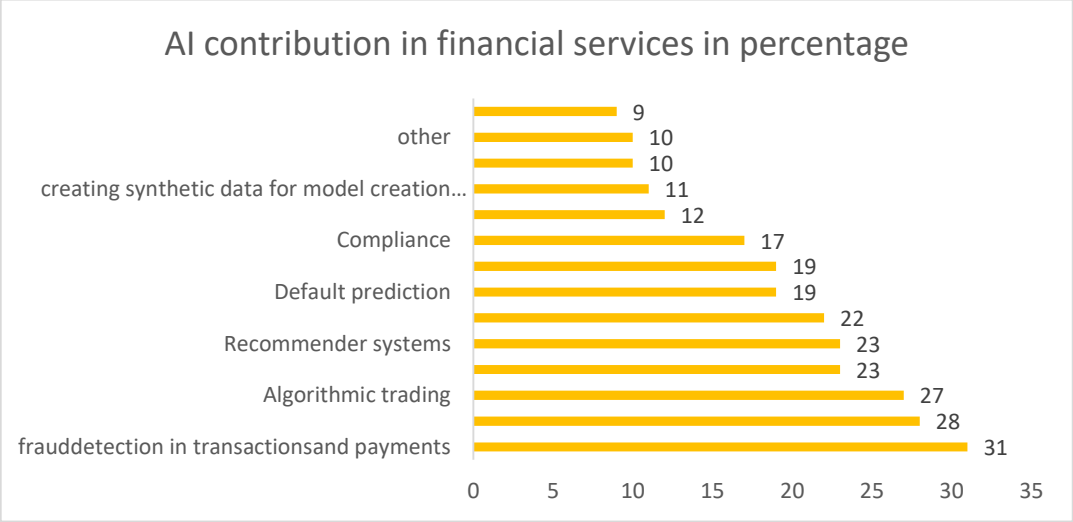


Source: www.kbvresearch.com

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By 2028, the global artificial intelligence in fintech market is projected to develop at a 16.8% compound annual growth rate (CAGR) to reach $28.5 billion.

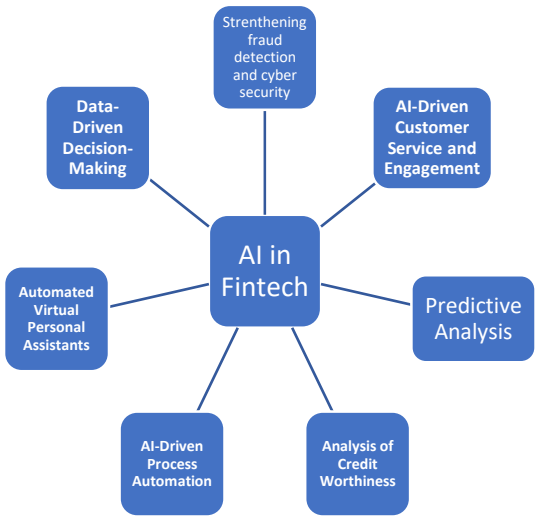
b.3) AI contribution in financial services in percentage



Source:State of AI in financial services trends 2022 Nividia

The chart states that AI is used for fraud detection of 31%followed by conversational AI 28% and Algorithmic trading 27%. This states that AI contributing for the development of fintech in the interface of cyber security.

b.4) AI is Revolutionizing the FinTech Industry



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Source:UVIK

Artificial intelligence (AI)-powered chatbots and virtual assistants are revolutionizing the finance sector by raising client happiness and engagement levels. They respond quickly and personally to client concerns, answer common questions, make product recommendations, and help with account management. Customers can get help at any moment via AI-powered customer assistance, which is available around-the-clock.

The number of cyberthreats and fraud attempts has surged due to the growth of digital transactions and online financial services. AI in FinTech and payments advances efforts in cybersecurity and fraud detection. According to a Juniper Research report, businesses will save over $10.4 billion by 2027 as a result of using AI-powered fraud detection and prevention solutions.

Machine learning algorithms are used in AI-driven predictive analytics to find patterns and trends in past data and produce more precise projections. Financial organizations may make better judgments about investments, risk management, and market trends by utilizing AI in predictive analysis. This improves portfolio performance and reduces risk.

Artificial intelligence (AI) technologies improve efficiency by lowering the time and effort needed for traditional manual analysis and by enabling data extraction, analysis, and usage for informed decision-making easier.

The application of AI technology in banking has made it possible to create automated virtual personal assistants that improve customer service. These helpers are capable of doing a variety of jobs, such as carrying out transactions on clients' behalf or offering real-time financial reports. AI-driven support platforms are able to monitor stock and bond market developments and give traders immediate trading advice.

FinTech companies replace human labor, automate routine business processes, and boost productivity with AI technologies. AI-powered automation increases operational efficiency and decreases manual

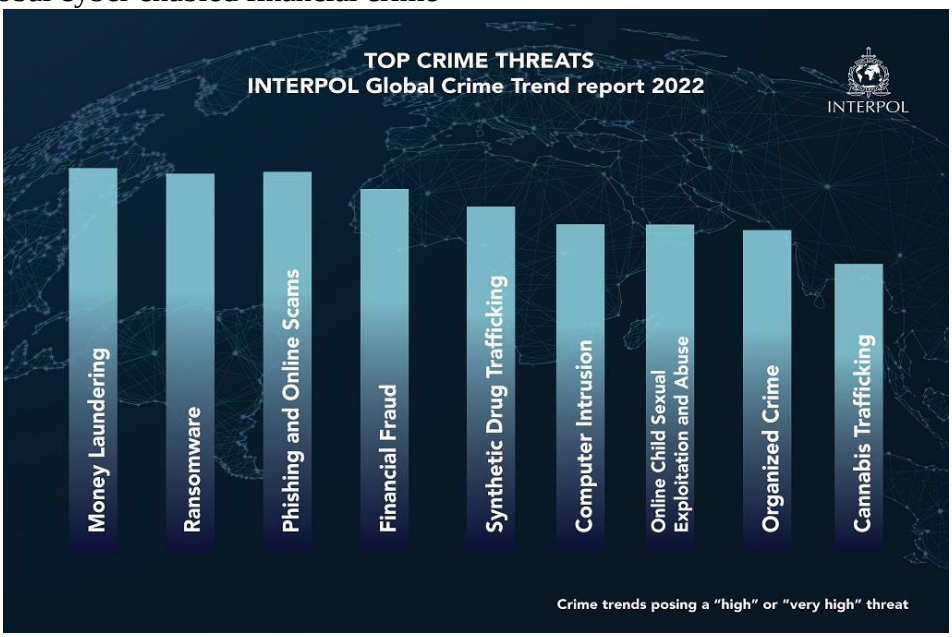
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labor. Financial institutions may save a lot of time and money by automating loan processing, document verification, and customer onboarding. Automation powered by AI guarantees higher accuracy and adherence to legal regulations.

Financial firms can use AI to precisely evaluate credit by efficiently analyzing vast amounts of consumer data. The credit, cash, and investment accounts of clients can all be evaluated by today's AI systems to determine their financial health. AI can speed up account support and assist banks in staying up to date with real-time changes by evaluating customer data.

c)Financial crimes, AI and Cybersecurity

c.1) Global cyber enabled financial crime



The terms "cyber-enabled" and "financial crimes" are synonymous since cybercriminals rely on financial fraud to launder their illegal earnings, and financial fraud is mostly enabled by digital technologies. In this sense, the pandemic has accelerated the emergence of "financial crime-as-a-service," which includes digital money laundering tools that can prove crucial for criminals looking to cash out, in addition to the well-known criminal idea of "cybercrime-as-a-service."
In the INTERPOL report, respondents ranked money laundering as the greatest threat to crime, giving it a "high" or "very high" grade from 67% of respondents. With a ranking of 66%,

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ransomware emerged as the second most significant danger, with 72% of respondents anticipating an increase in crime.

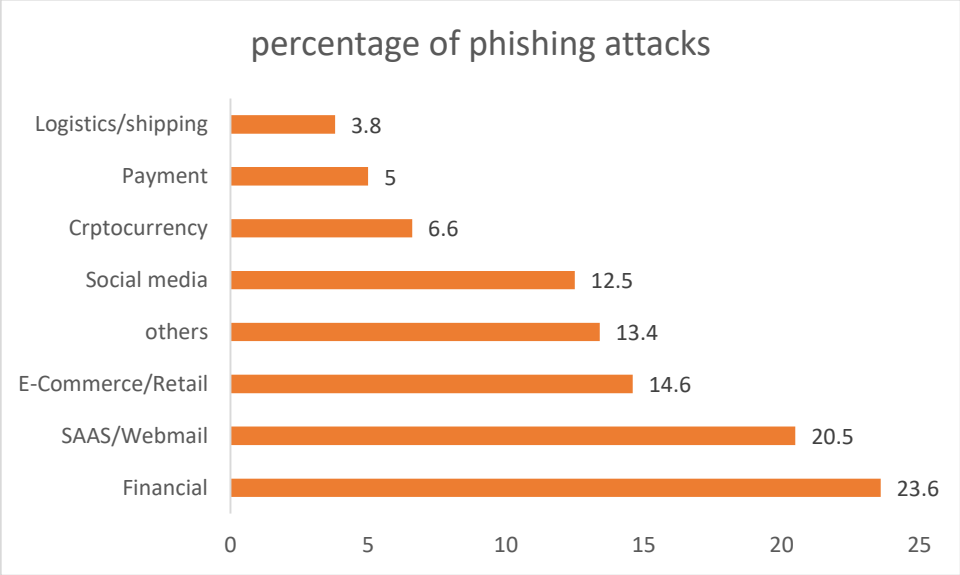
c.2)) Finance crimes growth rate in India

year	Financial crime cases	Percentage increase	Domestic payment fraud	Percentage increase	Digital loan app fraud	percentage increase
FY 21	2.62 lakhs	-	542.7 crores	-	26855	-
FY 22	6.94 lakhs	164.89%	2537.35 crores	367.50%	99260	267.76%

Source: National Crime Record Bureau

The figures above show that financial crimes of all kinds reached their peak. This forces financial firms to invest in cybersecurity in order to safeguard consumer privacy and confidentiality.

c.3) Percentage of phishing attacks

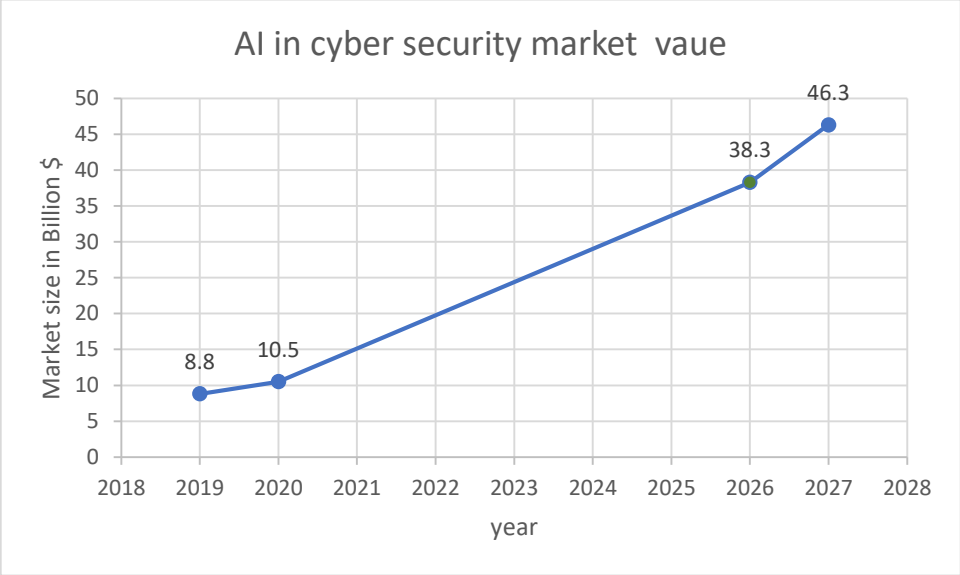


Source:Statista 2023

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The above chart shows the phishing attacks in percentage. The financial sector was attacked by 23.6%, followed by SAAS/webmail and e-commerce.

c.4) AI in cyber security market value worldwide



Source: statista 2023

Due to the increase in financial crimes, fintech companies are facing setbacks in their operations and investments. To leverage this, there is a need for cybersecurity solutions. Integrated AI solutions pave the way for the protection of financial fraud. The above chart confirms the size of the AI market in cyber security. The increase in market size was from 8.8 billion dollars to 46.3 billion dollars.

Hypothesis

H1: Investments in lending tech and payments contribute for fintech investments
H 2: AI and cybersecurity on fintech positively correlated

H1: Investments in lending tech and payments contribute for fintech investments

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Correlation Matrix

		Fintec	Lendingtech	Payments	Inurance tech	Neo banking	CrytoandWeb3	FintecSAAS
Fintec	Pearson's r	—						
	df	—						
	p-value	—						
Lendingtech	Pearson's r	0.957	—					
	df	6	—					
	p-value	< .001	—					
Payments	Pearson's r	0.955	0.833	—				
	df	6	6	—				
	p-value	< .001	0.010	—				
Inurance tech	Pearson's r	0.952	0.876	0.946	—			
	df	6	6	6	—			
	p-value	< .001	0.004	< .001	—			
Neo banking	Pearson's r	0.986	0.978	0.913	0.896	—		
	df	6	6	6	6	—		
	p-value	< .001	< .001	0.002	0.003	—		
CrytoandWeb3	Pearson's r	0.992	0.955	0.931	0.947	0.973	—	
	df	6	6	6	6	6	—	
	p-value	< .001	< .001	< .001	< .001	< .001	—	
FintecSAAS	Pearson's r	0.954	0.881	0.918	0.865	0.937	0.965	—
	df	6	6	6	6	6	6	—
	p-value	< .001	0.004	0.001	0.006	< .001	< .001	—

The coefficient correlation ranges from +1 to-1. Coefficient of +1 indicated positive correlation that means as one variable increases another variable also increases. Coefficient of -1 indicated negative correlation that means as one variable increases other variable also decreases.0 means no correlation.

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All the sub sectors in fintech contributing for the fintech growth and investments. It can be understood that all the subsectors are growing in the same pace and contributing for the fintech growth. Neo banking (r+9.86) and cryto and web 3(r+0.99) both the subsector was nearest to +1 which termed as strongly correlated. The other sectors were also positively correlated. When analyzing p-value which was less than 0.05 in all the sub sector shows that all the subsectors are significantly correlated.

Linear Regression

Model Fit Measures

				Overall Model Test			
Model	**R**	**R^2**	**Adjusted R^2**	**F**	**df1**	**df2**	**p**
1	1.000	1.000	1.000	1.01e+10	6	1	< .001

The "R—squared" or "adjusted R-square "in the output represents the proportion of the variance in the dependent variable predictable from the independent variables. In this analysis R-squared value indicates a better fit of the model since it is higher in its value.

A low p-value associated with the F-statistic indicates that at least one predicator variable is significantly related to the dependent variable.

Omnibus ANOVA Test

	Sum of Squares	**df**	**Mean Square**	**F**	**p**
Lending tech	16.30991	1	16.30991	14543.9	0.005
Payments	24.89116	1	24.89116	22196.0	0.004
Insurance tech	0.01149	1	0.01149	10.2	0.193
Neo banking	0.50346	1	0.50346	448.9	0.030
CrytoandWeb3	0.61137	1	0.61137	545.2	0.027
Fintech SAAS	0.28405	1	0.28405	253.3	0.040
Residuals	0.00112	1	0.00112		

Note. Type 3 sum of squares

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The above table of Omnibus ANOVA test states that Insurance tech is less significant that other tech in the contribution of fintech.

Model Coefficients - Fintech

Predictor	Estimate	SE	t	p
Intercept	-17.066	33.34662	-0.512	0.699
Lending tech	1.552	0.01287	120.598	0.005
Payments	1.353	0.00908	148.983	0.004
Insurance tech	-0.240	0.07499	-3.201	0.193
Neo banking	-1.248	0.05889	-21.188	0.030
CrytoandWeb3	1.574	0.06742	23.349	0.027
Fintech SAAS	0.847	0.05324	15.915	0.040

The above table provides the information about the coefficient of the regression equation. The estimate column represents the estimated coefficient of each predictor, in this Insurance tech and Neo banking shows negative value of (-0.240) and Neo banking (-1.248) both the sub components are deviate more than other predictors or both the sub components are less contributing for the fintech growth than other components.

SE is standard error which provides standard error of the estimate for each coefficient. Insurance tech predictor highest std error (0.07499) and payments least std error (0.00908)

The t column shows the t-statistic for testing the null hypothesis that the population coefficient is zero. In this highest t value is for payments (148.98) and lowest is insurance tech (-3.201).

P value shows p-value associated with the t-test. A low p-value (less than 0.05) indicates that the predictor variable is a significant predictor of the response variable. Except insurance tech (0.193) all the other predicators are less than 0.05 p-value.

Assumption Checks

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Normality Test (Shapiro-Wilk)

Statistic	p
0.910	0.352

The P-value is greater than the chosen significance level of 0.005 shows that data is not deviate from normality. The variables significant level is commendable.

H 2: AI and cybersecurity on fintech positively correlated

Correlation Matrix

		Fin tech market	AI in Fintech	AI in cyber security
Fin tech market	Pearson's r	—		
	df	—		
	p-value	—		
AI in Fintech	Pearson's r	0.964	—	
	df	4	—	
	p-value	0.002	—	
AI in cyber security	Pearson's r	0.989	0.950	—
	df	4	4	—
	p-value	< .001	0.004	—

The coefficient of correlation ranges from +1 to -1. A coefficient of +1 indicates a positive correlation, which means that as one variable increases, another variable also increases. A coefficient of -1 indicates a negative correlation, which means that as one variable increases, another also decreases. 0 means there is no correlation.

AI in cyber security and fintech is significantly correlated (0.989) with AI in fintech (0.964). The P value is less in AI in cyber security and fintech (.001) than in AI in fintech (0.002).

This shows that AI contributes to the fintech majority in cyber security. Fintech growth mainly depends on the development of integrated solutions in cybersecurity with AI tools.

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Linear Regression

Model Fit Measures

				Overall Model Test			
Model	R	R^2	Adjusted R^2	F	df1	df2	p
1	0.992	0.984	0.974	93.1	2	3	0.002

The "R—squared" or "adjusted R-square "in the output represents the proportion of the variance in the dependent variable predictable from the independent variables. In this analysis R-squared value indicates a better fit of the model since it is higher in its value.

A low p-value associated with the F-statistic indicates that at least one predicator variable is significantly related to the dependent variable.

Omnibus ANOVA Test

	Sum of Squares	df	Mean Square	F	p
AI in Fintech	4747	1	4747	1.11	0.369
AI in cyber security	44505	1	44505	10.41	0.048
Residuals	12823	3	4274		

Note. Type 3 sum of squares

The above table of Omnibus ANOVA test states that AI in cybersecurity is highly significant .

Model Coefficients - Fin tech market

			95% Confidence Interval			
Predictor	Estimate	SE	Lower	Upper	t	p
Intercept	-520.3	223.5	-1231.671	191.1	-2.33	0.102
AI in Fintech	49.8	47.2	-100.527	200.1	1.05	0.369
AI in cyber security	34.6	10.7	0.475	68.7	3.23	0.048

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The above table provides the information about the coefficient of the regression equation. The estimate column represents the estimated coefficient of each predictor, in this AI in fintech is 49.8 and AI in cyber security is 34.6.

SE is standard error which provides standard error of the estimate for each coefficient. AI in fintech standard error is 47.2 and AI in cyber security standard error is 10.7

The t column shows the t-statistic for testing the null hypothesis that the population coefficient is zero. In this highest t value is for Ai in cyber security (3.23) and AI in fintech (1.05).

P value shows p-value associated with the t-test. A low p-value (less than 0.05) indicates that the predictor variable is a significant predictor of the response variable.AI in cyber security is the significant predictor in Fintech.

Normality Test (Shapiro-Wilk)

Statistic	p
0.856	0.176

The P-value is greater than the chosen significance level of 0.005 shows that data is not deviate from normality. The variables significant level is commendable.

5. Findings

- The potential for the fintech industry in India is projected to reach $1.3 trillion by 2025, expanding at a 31% compound annual growth rate from 2021 to 2025.
- Fintech segment wise, the highest percentage was taken by lending tech (270 billion dollars) market size, followed by payments.
- The growth of the Indian fintech market shows that lending technology is expected to make up 47%, with insurance tech coming in second at 26% and digital payments at 16%.

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- Fintech investments in India show a tremendous increase from FY 2019 to FY 2022, but in FY 2023, an impression is observed and there are great chances of recovery due to world market expansion.
- The fintech component-wise analysis states that before FY 2023, payments investments were more than lending tech, but after FY 2023, lending tech investments are more than payments. This is a predicted analysis.
- Artificial intelligence (AI) technology provides 56% of financial services, which is higher than other technologies. This can be better interpreted as indicating that AI technology is very much used in financial services.
- The global artificial intelligence in fintech market is projected to develop at a 16.8% compound annual growth rate (CAGR) to reach $25.8 billion.
- AI is used for fraud detection in 31% of cases, which shows that AI is contributing to the development of fintech at the interface of cyber security.
- Artificial intelligence (AI)-powered chatbots and virtual assistants are revolutionizing the finance sector by raising client happiness and engagement levels.
- AI in FinTech and payments advances efforts in cybersecurity and fraud detection.
- Machine learning algorithms are used in AI-driven predictive analytics to find patterns and trends in past data and produce more precise projections.
- The application of AI technology in banking has made it possible to create automated virtual personal assistants that improve customer service.
- AI-powered automation increases operational efficiency and decreases manual labor.
- In the INTERPOL report, respondents ranked money laundering as the greatest threat to crime.
- According to the National Crime Record Bureau, financial crime in India reached its maximum.
- Phishing attacks are very common in the financial sector.
- Integrated AI solutions pave the way for the protection of financial fraud, which leads to an increase in the AI market in cyber security.
- The latest trends in AI in cybersecurity, such as threat exposure management, identity fabric immunity, cybersecurity validation, etc., increase the fintech market.

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- Current risks and challenges in fintech in India are population without bank accounts, lack of skill, lack of explicit rules and compliance laws, and data security and privacy.
- P value shows p-value associated with the t-test. A low p-value (less than 0.05) indicates that the predictor variable is a significant predictor of the response variable. Except insurance tech (0.193) all the other predicators are less than 0.05 p-value.
- P value shows p-value associated with the t-test. A low p-value (less than 0.05) indicates that the predictor variable is a significant predictor of the response variable.AI in cyber security is the significant predictor in Fintech

6. Discussion points:

- Due to the increase in automation, the extent of systematic cyber risk is also increasing. It is in evident that cybersecurity measures have to be taken through the lens of the hacker to gain a progressive insight into security and protecting data.
- The interaction between AI and cyber security is high, and this integration is extremely useful for businesses to fight business interruptions, data breaches, and even physical damage. The hackers are exploiting the relationship between AI and cyber security to achieve unprecedented heights in cybercrime.
- The most destructive use of the technology takes place when cybercriminals make use of AI to hack into systems by detecting the passwords for users' credentials.
- AI is reshaping the fintech landscape, revolutionizing customer service.
- The growth of fintech must support all the integrative solutions, considering both customer safety, security, and government compliance.
- Due to the increase in financial fraud, the majority of online platforms necessitate the development of advanced fintech solutions.
- Worldwide centralized data integrated solutions for the online financial frauds by which the frauds can be identified

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7. Conclusion:

This study concludes that fintech is the major component contributing very much to the financial services sector. AI is one of the major technologies used in fintech. The area of interface between AI and fintech is cyber security; it is the major area on which future fintech is based. Further, the study states that lending technology is gaining more investment than the other sub sectors.AI in cybersecurity is more pronounced than AI in fintech. The growth of fintech is multifold, as is financial crime. Positive AI-integrated solutions are required to support fintech companies.

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