

IOT Impacts and Digital Transformation at Listed Vietnam Banks

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Abstract

The Industrial Revolution 4.0 based on digital technologies has led to an unprecedented change in the socio-economic model. Therefore, countries in general and Vietnam are all aiming to develop the digital economy. The concept of digital transformation of the economy or development of the digital economy in Vietnam focuses on the following basic contents: 1) Developing digital businesses; 2) Digital transformation for traditional businesses (towards digitally integrated products; transforming business models on digital platforms; changing production processes based on digital data, automation, virtualization, etc.); 3) Development of digital finance; 4) E-commerce development. Therefore, digital transformation becomes an inevitable and objective trend, supporting banks to overcome challenges, create competitive advantages, and actively adapt to the context of digital transformation. In the context of the development of the digital economy in Vietnam is taking place strongly across industries and fields, requiring banks in Vietnam to have a transformation to a new business model. In this business model, it is necessary to integrate technology in operations and digitize business processes in the direction of automation and intelligence. Thereby, banks can perform activities of providing products and services on digital platforms, effectively exploiting data, thereby increasing experiences in business resolution and customer engagement.

Besides, Internet of things has connect everything through internet, therefore risk management information system of Vietnam banks is also affected by IoTs and reliable internet data can help to enhance better RMIS in commercial banks.

Generally, we want to emphasize effects of IoTs and digital transformation in banks operation and new business models.

Keywords

Digital Banking, Digital Transactions, Electronic Payments, Online Exchanges, Online Loans.

JEL Code: M1, M3, J11.

Introduction

Vietnam is a developing country, the application of ICT and digital technologies in economic fields is receiving strong attention. Directive No. 52-NQ/TW of the General Secretary issued on September 27, 2019 has emphasized a number of undertakings and policies to actively participate in the Fourth Industrial Revolution. This directive has emphasized that Vietnam's level of active participation in the Fourth Industrial Revolution is still low. Institutions and policies have many limitations and shortcomings. The structure and quality of human resources have not met the requirements. Science - technology and innovation are not really driving forces for socio-economic development; The new national innovation system has just been formed, has not been synchronized and effective. The process of national digital transformation is still slow and lacks initiative due to limited infrastructure for digital transformation; many enterprises are still passive, the capacity to access, apply and develop modern technology is still low. The digital economy has a small scale...". Therefore, the Party Central Committee said that "Actively and actively participating in the Fourth Industrial Revolution is an indispensable and objective requirement; is a task of particularly important strategic significance, both urgent and long-term, of both the political system and the whole society, closely associated with the deep international integration process; at the same time, fully and properly aware of the content and nature of the Fourth Industrial Revolution to be determined to renew thinking and action, considering it a breakthrough solution with appropriate steps and roadmap. This is an opportunity for Vietnam to make a breakthrough in socio-economic development". In addition, Decision No. 1238/QD-NHNN dated July 8, 2020, which sets out specific plans, tasks and solutions to facilitate the application of 4.0 technology and promote innovation. Creation and implementation of digital transformation in the banking industry.

To realize digital transformation and better reach customers, banks or businesses can devise marketing and promotion strategies, pricing strategies as well as timely customer care services (Oliver, 1999). The problem of customer marketing was addressed by Thorsten & Alexander in 1998. Mons et al. (2011) also pointed out that the company's product development marketing strategy is based on research on marketing strategy and customer interest. Hay Papasolomou et al (2014) has promoted a customer marketing strategy based on public relations marketing.

Literature Review

First, Cuesta et al (2015) stated that banks are keeping pace with digital transformation and follow several stages in process of digitalization such as: development of products and new channels, and characterizing adaptation of the technological infrastructure.

Pawadi (2018) stated that because clients of banks are more sophisticated, omni channels banking is a prospect to take bottom line on higher note by gaining insights from customer behavior and preferences.

Then, Khanchel (2019) said that in Tunisian banks, digital transformation is performed on the board Matine Consulting firm.

Baskerville et al (2021) mentioned that the integration of digital tech in banks will be present in The year 2021. Last but not least, Galazova and Magomaeva (2019) pointed that we need to understand concepts of financial technologies, and its architecture change in banking operation.

And Vu Quynh Nam, Duong Thi Tinh, Dinh Tran Ngoc Huy et al (2021) stated that Internet of things (IoTs), Artificial intelligence (AI) have some certain influence on several sectors such as education, industries, etc. and affect risk management information system of both IT firms and other industrial companies.

Methodology

Method and Data

This study mainly use combination of quantitative methods and qualitative methods including synthesis, inductive and explanatory methods.

We use both quantitative and qualitative analytical methods, with OLS regression supported by Eviews. Data is collected from reliable internet sources and websites as

below: Stock price from HOSE or HNX stock exchange, rates from bank system, GDP and CPI from Bureau statistics and Ministry of Finance.

Main Results

Contents of Digital Transformation in the Banking Sector

Thus, the goal of digital transformation of the banking industry is a priority for Vietnam in the current period. To carry out digital transformation of the banking industry, it is necessary to build electronic finance and basically establish a modern, sustainable, open and transparent digital financial foundation based on big data, open financial data and digital financial ecosystem, on the basis of financial industry open data. Deploying digital technology application in tax, customs, treasury and securities industries. For example, the application of big data processing and analysis technologies for risk management, anti-smuggling, tax inspection and examination; analyzing big data on social networks to manage fraud and tax loss in online business activities; IoT application in customs supervision management; analyze information on social networks and use AI to support securities transaction monitoring and combat manipulation. Deploy electronic payments; pilot using telecommunications accounts to pay for digital content services, small-scale e-commerce and evaluate to replicate this model (mobile money). Developing digital banking and FinTech so that by the end of 2020, the proportion of cash in total payment will be less than 10%. Specific tasks to be carried out for banks: Banks need to develop a digital transformation plan. Banks need to step by step digitize their business operations, including digitizing implementation processes. Banks need to train and improve staff capacity to meet the requirements of the digital transformation process.

Results of Digital Transformation in the Banking Sector Today

Digital banking development is the integration of technology into processing business processes in the direction of automation. Thereby, providing banking products and services on digital platforms to customers. Thereby, the bank can also perform data mining through the process of communicating with customers. The development of digital banking allows banks to provide a wider range of products and services to customers. Through the digital platform, banks can connect different service layers into the banking system. Therefore, the needs of customers' money-related transaction services can be met through the banking system. From basic services such as capital mobilization or bank loans to more complex services, all can be solved on a digital platform.

Vietnam has a growth rate in Mobile Banking of 200% and currently has about 30 million people using the bank payment system every day. Therefore, it is necessary to develop a plan and action program of the banking industry and implement a digital transformation strategy to adapt to the context of Industry 4.0 in the current period. In addition, the Banking Industry Information Technology Development Strategy to 2025 with orientation to 2030 also sets specific goals for the entire industry: "successfully implementing the digital transformation plan in the banking industry." "; banks "standardize banking operations and operations on the basis of technology... develop digital banking services in cyberspace".

Digital Conversion Results at some Big Banks

Currently, most banking transactions are done online via the Internet. Most banks have promoted lending services, supporting services that arise after lending to serve customers. Customers were able to make loans, repay loans, issue cards, transfer money, and make payments on the bank's digital platform. At the same time, the bank cooperates with payment intermediaries to meet the maximum payment needs in customer spending at the bank's service delivery channels or the sales channels of its partners. Vietcombank has implemented VCB Digibank digital banking service. BIDV launched the Digital Transformation Campaign. VietinBank deploys VietinBank iPay Mobile 5.1 application, VPBank launches Yolo digital bank after Timo model. Techcombank pioneered the launch of "Zero fee" on F@st Ebank. TPBank launches LiveBank application. HDBank has HDBank mBanking service. ACB has ACB mBanking service...

TPBank has successfully implemented digital form service for customers. Customers can manually enter information in a form on their online website. Customers can manually enter information into the form. The authentication part will go to the bank. This helps to shorten transaction processing time and increase labor productivity. At BIDV bank, robots performed business processes on behalf of employees. This helps BIDV increase labor productivity, save salary costs and promote business process automation. According to calculations, robot processing time is only 20% of human processing time. Since then, 80% of the operation time can be reduced when using the robot, saving VND 2.7 billion in annual employee salary costs.

Digital transformation is not only a goal but also a tool for MB. To be able to offer such a highly digitized service, the movement must be more digitized. The digital transformation strategy has been widely deployed by MB since 2018. In addition to the mandatory core management system for banks, T24, MB uses 1Office to optimize the working process.

Office offers a solution to digitize banks and easily link MB's branches together. Through the application of digital technologies to transaction processing, MB has achieved impressive results. In 2019, the total number of financial transactions on digital banking channels increased by approximately 11 times compared to 2017; increased by 5.6 times over the same period in 2018; total financial transaction turnover on digital banking channel increased 4.5 times compared to 2017; nearly doubled compared to 2018.

Digital Transformation Results at some Small-scale Banks

Nam A Bank has become the first commercial bank to apply robot technology to transactions (Robot OPBA) to increase user experience and most recently using online customer information authentication (eKYC); OCB has also digitized the account opening service, with just 3-5 minutes, customers can open an online account with OCB Omni digital bank and this bank has just launched a version of OCB Omni 2.0 focusing on personalization user experience...

Digital transformation is an inevitable trend for banks in the current context. The development of technology has shifted consumer habits, including payments and transactions. Therefore, the National Digital Transformation Program aims at the dual goal of developing the digital government, digital economy, and digital society, as well as forming Vietnamese digital technology enterprises capable of going global.

The development of big data warehouses to facilitate the collection, analysis and processing of big data will create new knowledge, support quick and effective decision making at banks. This can only be achieved by implementing digital technologies into the bank's operations.

Effects of Internet of Things and Internet Data on Risk Management Information System (RMIS) of Banks

A. First, using internet data from stock exchange we can estimate market risk of listed banks

For instance, we see below figure:

- Beta is calculate form movement of stock price, data online and available on stock exchange, and calculated with traditional beta formula

Table 1 Statistics of market risk of banks

No change leverage	Equity beta max	1.004	Reduce 20% leverage	Equity beta max	1.004	Increase 30% leverage	Equity beta max	1.004
	Asset beta max	0.082		Asset beta max	0.267		Asset beta max	0.043
	Equity beta var	0.118		Equity beta var	0.081		Equity beta var	0.194
	Asset beta var	0.008		Asset beta var	0.005		Asset beta var	0.008

(Source: online data from Vietnam stock exchange 20007-2011 and authors calculation)

Then we see that:

- Asset and equity beta of Vietnam banks can be estimated with leverage ration (from annual reports, data online on firm website and on stock exchange) as follows.

Table 2 Market risk of listed banks

Bank	No change leverage	Reduce leverage 20%	Increase leverage 30%
ACB	0.787	0.787	0.787
CTG	0.554	0.554	0.554
EIB	0.385	0.385	0.385
HBB	0.134	0.346	-0.235
MBB	0.072	0.236	-0.214
NVB	0.021	0.125	0.046
SHB	1.004	1.004	1.004
STB	0.74	0.74	0.74
VCB	0.408	0.408	0.408

(Source: online data from Vietnam stock exchange 20007-2011 and authors calculation)

Next we see that:

- Variation of beta of Vietnam banks can be estimated with leverage changing and tax rate changing (from annual reports, data online on firm website and on stock exchange) as follows.

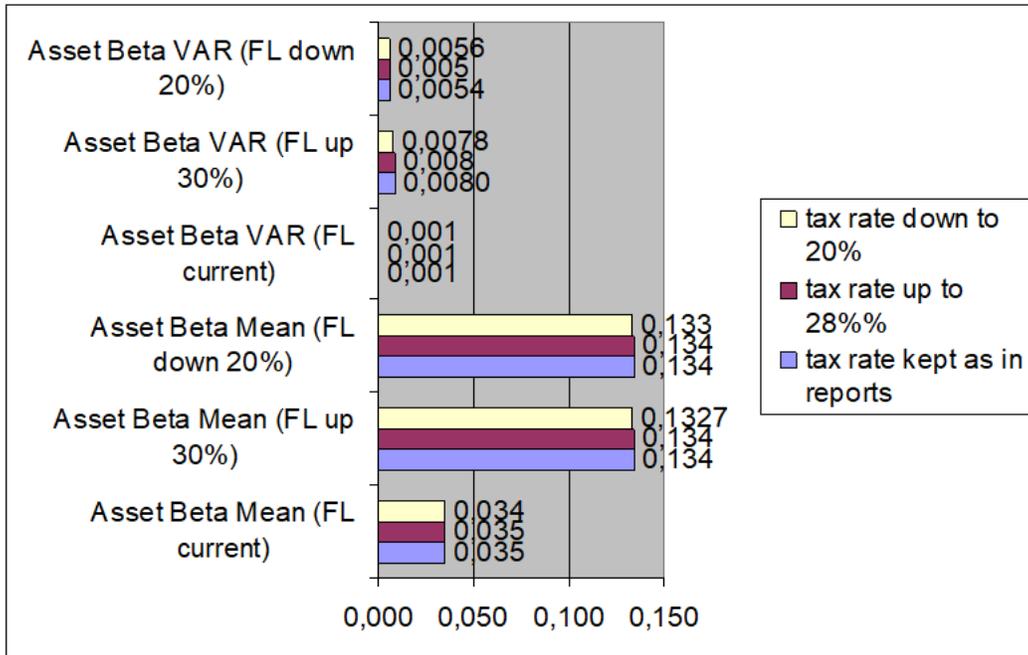


Chart 1 Vietnam banks Market risk under scenarios

(Source: online data from Vietnam stock exchange 20007-2011 and authors calculation)

B. Second, reliable internet sources can provide suitable database to estimate macro effects on market risk of listed banks

For instance, we see:

- Standard deviation and skewness can be calculated with CPI, G, Rf data online from website of State bank, Ministry of Finance and bank system, online data.

Table 3 Descriptive statistics of Vietnam bank

	BetaCTG	CPI	Exrate	G	IM	R	Rf	SP500	Trade balance	VNIndex
Mean	0.65	0.02	22809	0.05	166	0.09	0.03	2670	4.4	822
Median	0.49	0.03	22923	0.06	150	0.09	0.03	2590	-100	858
Max	2.53	0.04	23230	0.07	267	0.11	0.06	3703	410	1067
Min	-0.27	0.006	21780	0.018	127.3	0.08	0.012	2043	-500	579
Standard dev	0.7	0.01	427	0.017	42.1	0.01	0.016	513	313	172

(Source: online data from Vietnam stock exchange 20007-2011 and authors calculation).

For instance, we see:

- Correlation can be estimated from online data of industrial manufacturing, SP500, trade balance, VNIndex, all data from stock exchange VN and US.

Table 4 Correlation matrix of Vietnam bank

Correlation matrix										
	BetaCTG	CPI	Exrate	G	IM	R	Rf	SP500	Trade balance	VNIndex
Beta CTG	1.00									
CPI	0.33	1.00								
Exrate	-0.2	0.35	1.00							
G	0.14	0.08	-0.08	1.00						
IM	0.76	0.41	-0.08	0.18	1.00					
R	0.13	-0.41	-0.77	-0.26	0.09	1.00				
Rf	0.25	-0.18	-0.72	0.46	0.15	0.6	1.00			
SP500	-0.27	0.25	0.68	-0.4	-0.21	-0.6	-0.67	1.00		
Trade balance	-0.42	-0.2	0.53	-0.5	-0.38	-0.3	-0.83	0.84	1.00	
VNIndex	-0.15	0.41	0.76	-0.05	0.008	-0.87	-0.82	0.86	0.6	1.00

(Source: online data from Vietnam stock exchange 20007-2011 and authors calculation)

For instance, we see:

- OLS regression can be done for can be estimated from online data for effects of internal and external factors.

Table 5 Internal and external effects on beta of Vietnam bank

Data	Internal effects		External effects	
	Co-efficient	R-squared, SER	Co-efficient	R-squared, SER
G	-17.1			
CPI	-0.6			
R	-55.6			
Rf	13.7			
VNIndex	-0.002			
IM	0.01			
Ex rate			-0.0001	
SP500			0.0004	
Trade balance			-0.001	
		0.67; 0.59		0.2; 0.7

(Source: online data from Vietnam stock exchange 20007-2011 and authors calculation)

Conclusion

Although the development of digital banking is receiving encouragement and support from regulators, in reality, the policies and legal regulations are incomplete and somewhat inconsistent. The current issue of authentication and information security for customers has not met the operational requirements of the banking industry. Moreover, the staff knowledgeable in banking and finance has increased dramatically along with the

promotion of the use of digital technologies at the bank. On the other hand, technology transformation often requires a large amount of investment, so it requires banks to always find ways to improve operational efficiency as well as capital use. Therefore, banks need to perfect the national population database system and mobilize capital from the community in order to make better use of technological achievements. Banks also need to have a plan to prepare capital as well as choose an appropriate digital banking development investment plan. Banks need to have closer coordination with human resource training institutions in banking to orient universities in training human resources to adapt to operating digital technologies.

Second, we would like to mention that with internet of things, banks now can know which is market risk level happening to their business on stock market easily. And it helps one bank to compare risk level to another banks and to average index of bank risk.

Limitation of Research

Author can expand research models to other industries and markets.

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