

Impact of knowledge absorption on Vietnamese commercial bank's product innovation

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Abstract—This paper explores the impact of knowledge absorption on the production innovation in Vietnamese commercial bank base on determining factors that influence bank's product innovation in Vietnam. The framework is proposed base on inheriting and adjusting from previous study. Data were collected from 234 employee in Vietnamese commercial bank through a questionnaire survey from May to August 2022 and processed by SPSS. The empirical results from analysis of data collected point out that knowledge absorption has significant effects on Vietnamese commercial bank's product innovation through two factors which are scanning and communications. The study's results are expected to help bank managers use direct efforts and resources in the most effective and efficient way to encourage bank's product innovation to improve their business in the long run.

Index Terms—product innovation, knowledge Absorption.

I. INTRODUCTION

In the current quickly changing business environment, many businesses have started to look to innovation as a significant differentiator for competitive advantage. Innovation is considered as a key driver for long-term success of an organization, especially in dynamic and competitive markets [1]. Innovation capacity helps businesses cope with the storms, changes and complexity in the external business environment. Businesses with innovation capabilities will then be able to respond to challenges faster, produce rapidly improved products, and exploit business opportunities more effectively than those without innovation [2].

Innovation is understood as a new or improved product or process (or a combination of both) that is significantly different from the organization's previous product or process, and is made available to potential users (when as a product) or applied within an organization (as a process)[3]. Innovation means broader than ideas, implementation on demand, not necessarily based on R&D activities, needs to be new and goal-oriented, but does not guarantee success. As a result, knowledge is a crucial tool for establishing core competencies, safeguarding priceless heritage, learning new skills, and launching novel circumstances.

The firm's capacity for absorption is said to have a considerable impact on its capacity for innovation, according to a number of earlier studies of innovation [4, 5]. For instance, Quinn et al. [6] claim that a company's competitive advantage is built upon its ability to exploit its capacity for absorption to create distinctive competitive abilities. They offer no advice on how to do this, though. Furthermore, other similar studies give little insight into how to create or en-

hance absorptive capacity. In this study, we define absorptive capacity as the employees' aptitude and desire to acquire outside information and their readiness to apply this information to the firm's innovation capability. The ability to acquire knowledge and the quantity of work required to put it into use are highlighted by absorptive capacity.

Additionally, due to the fact that services are less standardized, frequently not product-focused, and significantly fragmented than in other industrial industries, innovation in the banking sector has garnered less attention and research. It is more challenging to examine the innovation capability of banks due to the emphasis on client engagement and the intangible aspects of banking services [7]. Innovation in the banking sector necessitates prerequisites and an awareness of the operational characteristics of the banking sector because invention in banking is not necessarily a comprehensive innovation.

However, several previous studies on the impact factor models studying the factors that directly or indirectly affect the creativity of banks. These factors can have a positive (facilitating) or negative (reducing) influence on the innovation of a bank. Currency trading, providing banking services is one of the business areas in which the creation of completely new products is very difficult due to the specific and standardized nature of the products [8]. However, competition in the banking industry is very strong at the moment [9]. Therefore, commercial banks need to regularly introduce innovations to improve competitiveness. In that condition, it is very necessary to identify the factors that can affect the innovation capacity of commercial banks.

So that, this study is expected to help bank managers in Vietnam's banking industries use direct efforts and resources in the most effective and efficient way to encourage bank's product innovation to improve their business in the long run. The paper explores the impact of knowledge absorption on the production innovation base on analyzing data collected from 234 bank's employee. The rest of the paper as follow. The literature is reviewed, and the study framework and hypotheses are suggested in Section II. The research technique is described in Section III of this article. The results of the data analysis are described in Section IV. Section V discusses managerial implications and a brief conclusion.

II. THEORETICAL BACKGROUND AND HYPOTHESIS

A. Knowledge absorptive capacity

Knowledge absorptive capacity is understood as "the organizational mechanisms that help identify, communicate, and assimilate relevant external and internal knowledge". Refers to an organization's ability to identify, absorb, and use knowledge sources to develop newer knowledge that is new to the organization. Absorptive capabilities are tools that let a business find, share, and incorporate knowledge that is present in its internal or external environment. According to this perspective, "the firm's existing knowledge base, the effectiveness of systems that scan the environment, and the efficacy of the firm's communication operations are regarded to be the elements of absorptive capability." [10].

The capacity to absorb knowledge is expressed in five aspects, namely, the knowledge capacity of employees, managers, information systems, communication environment and exploitable knowledge sources [10]. The capacity of good employees is favorable in exploiting and using existing and new knowledge. A strong information network makes it easier to access new sources of knowledge and promotes the sharing of knowledge. An environment of open communication can enhance an organization's ability to innovate by encouraging both teamwork and open communication [11].

Knowledge absorption capacity can be considered as a system that enables businesses to locate and acquire pertinent internal and external knowledge sources, which can increase their capacity for innovation [10]. The scale of knowledge absorption capacity, inherited from the research of Najafi-Tavani [12], is a multi-level silver scale with 5 main components: knowledge absorption capacity of bank employees, capacity managers' resources, information systems, communication environments, and knowledge sources.

B. Product innovation

The OECD defines a product innovation as a new or significantly improved product/service compared to other products/services of the organization, including an improvement of one or more characteristics or features. such as quality, technique, friendliness [3]. Product innovation give a provision of new or significantly improved goods or services compared to the existing goods and services that the organization is providing, includes changing the characteristics of goods and services, software applications, or changing the way that customers can access to use goods and products in order to meet the maximum needs of customers compared to other products and services[13].

Product innovation is a difficult process driven by advanced technologies, changing customer needs, shortening product life cycles and increasing global competitiveness [14]. For successful product innovation, a strong interaction between organizations and customers and suppliers is required [15]. The scale of a bank's product innovation includes a significant change in product characteristics, creating new product service or an improved service or product, introducing and bringing a new product to market, or improving an existing product in terms of functionality, quality or appearance [11].

Therefore, the bank's product innovation capacity, based on the inheritance of existing studies Liao et al [16] and Lin et al [14] is measured on five dimensions : improve product quality; reduce the cost of products; develop new features; added new features; and add new products

C. The relationship between Absorptive capacity and bank's product innovation

The ability to absorb knowledge is known to be very important for an organization's innovation capacity [12]. While the linking system factor is concerned with external knowledge, knowledge absorption capacity focuses on internal knowledge acquisition to create new knowledge [10]. Previous studies have suggested learning orientation as an essential prerequisite for organizational innovation [17]. Then recent studies have emphasized the concept of knowledge absorption capacity to clarify the learning process in organizations [12].

The model proposed by Najafi-Tavani considers the factors affecting the innovation capacity of the organization based on the theory of learning capacity and organization [12]. The innovation capacity of the organization depends on two main groups: the capacity to absorb knowledge to exploit the organization's internal resources and the ability to cooperate and link external partners. However, the degree of cooperation with external parties such as customers, suppliers, competitors and research institutions to enhance innovation capacity depends on the ability of that organization to absorb knowledge. If the organization has a good ability to absorb knowledge, it will more effectively exploit external resources and thereby innovate better.

High levels of manager and employee knowledge put a company in a better position to absorb and use new information sources, which makes it more capable of creating new knowledge. While the communications climate refers to the environment within the firm that decides, the communication network refers to the size and strength of structural relationships. A strong communication network not only makes it easier for the company to acquire new knowledge sources, but it also makes it easier for knowledge—especially highly tacit knowledge—to be shared. Through fostering teamwork and an open exchange of information, an open communication environment can improve the firm's capacity for innovation [18]. Finally, knowledge scanning can be seen as a method that enables organizations to locate pertinent internal and external information sources, which can improve their capacity for innovation.

According to Cohen and Levinthal [4], one of the key factors affecting an organization's capacity for innovation is how well it uses the external knowledge it has amassed. In their analysis of earlier research on absorptive capacity, Zahra and George [19] discover a substantial positive association between absorptive capacity and innovation because both elements combine to create the organization's competitive edge. According to Knudsen and Roman's empirical study [5], absorptive capacity has a significant role in forecasting an organization's capacity for innovation.

Base on this prior research, our study propose that the bank with higher knowledge absorption capacity would have

a higher product's innovation capability. Therefore, the following is hypothesized:

Hypotheses: Knowledge absorption capacity has a positive impact on bank's product innovation

The research framework is shown in Figure 1.

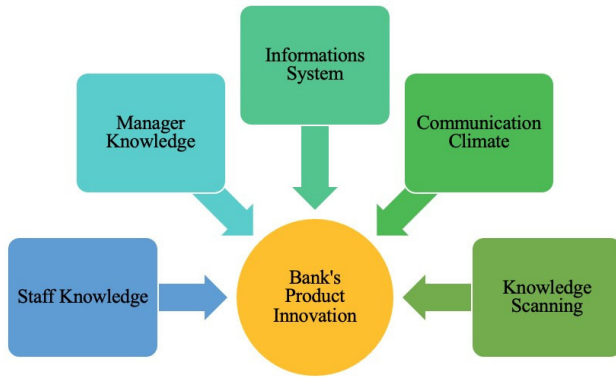


Fig.1 Research model

III. METHODOLOGY

A. Measurement

The constructs were measured using a five-point Likert scale (1 being totally disagree to 5 being completely in agreement). The research framework used here, bank's product innovation is dependent variable that is described as is the creation and distribution of a new product to market or the change of a current product's features, consistency of quality, or presentation. This study employs the concepts of Liao et al [16]. Therefore, the bank's product innovation capacity, based on the inheritance of existing studies Liao et al [16]; Lin et al [14] is measured on five dimensions. There are 5 items (SP1 – SP5) relating to these constructs: improve product quality; reduce the cost of products, develop new characteristics; added new features; and add new products.

On the other hand, knowledge absorption capacity refers to bank's ability to identify, acquire, and use knowledge sources to develop newer knowledge that is new to the bank. The capacity to absorb knowledge is expressed in five aspects, namely, the knowledge capacity of employees, managers, information systems, communication environment and exploitable knowledge sources according to Tu et al [14]. Thus, this study employs constructs the scale of knowledge absorption capacity, inherited from the research of Najafi-Tavani et al [20] and Tu et al [14] which is a multi-level silver scale with 5 main components as five independent variable as follow: knowledge absorption capacity of bank employees (items ACS1-ACS3), capacity managers' knowledge (items ACM1-ACM4), information systems (items ACN1 – ACN5), communication environments (items ACC1- ACC6), and knowledge scanning (items ACK2-ACK7).

B. Sample and procedure

Banks were selected to be included in the study based on their representativeness by ownership, size and transparency of information. The research has selected 18 satisfactory commercial banks. Conduct a survey through a questionnaire distributed to the respondents who are employees of

commercial banks selected in the research sample to collect opinions and evaluations on the Bank's Knowledge absorptive capacity and product innovation. The questionnaire was built on Likert scale. The data was collected in 2021. Collected data was aggregated, cleaned and analyzed. EFA exploratory factor analysis method to identify factors affecting the bank's product innovation. A regression analysis was then performed to evaluate the impact of Knowledge absorptive capacity on Bank's product innovation. All data analysis was performed on SPSS ver 20 software.

TABLE 1: SAMPLE

Characteristics of respondents	N	%
Bank's size	234	100
Small	50	21.4
Medium	71	30.3
Large	113	48.3
Position	234	100
Staff	159	67.9
Manager of branch	57	24.4
Manager of department	12	5.1
Manager at head office	6	2.6
Experience	234	100
Less than 3 years	70	29.9
From 3 years to less than 6 years	34	14.5
From 6 years to less than 10 years	49	20.9
From 10 years or more	81	34.6

Statistical of 234 observations in the research show that the most respondents belonging to the group of large banks (accounting for 48.3%), followed by medium-sized banks (accounting for 30.3%) and the group of medium-sized banks (accounting for 30.3%), the small-scale have 21.4%; Most of the respondents were employees (67.9%), followed by branch managers 24.4%, then senior managers at departments and headquarters with 7.7%. The survey results have good value and high reliability because most of the respondents have a lot of work experience. According to the sample structure, 34.62% are members who have worked for more than 10 years with the bank, 20.9% of the members have worked for 6 to 10 years at the bank and 14.5% of the research sample is members who have worked for 3 to 5 years at the bank, and only 70 people have worked at the bank for less than 3 years (accounting for 29.9%). Thus, most of the survey participants were engaged and devoted as well as understood the bank's organization and operation and business results. Therefore, the quality of the data obtained from the survey was high by their contribution to the survey.

C. The reliability of the scale

The reliability of the scale is assessed using the Cronbach Alpha reliability coefficient. When the standard has an alpha confidence of 0.60 or more, the scale is chosen. Variables with a total correlation coefficient less than 0.30 will be removed from the scale. The following table displays the findings of the scales' Cronbach's alpha study.

IV. RESULTS

A. Exploratory Factor Analysis (EFA)

The exploratory factor analysis (EFA) method was used to identify the factors that affect the product innovation capacity of Vietnamese commercial banks. Variables with a weight less than 0.50 in the EFA will be discarded. The fac-

TABLE 2: RESULTS CRONBACH'S ALPHA OF THE MEASUREMENT

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Scale Staff Knowledge Cronbach's Alpha 0.920					
AC S1	11.49	4.903	.846	.728	.886
AC S2	11.72	4.607	.805	.667	.902
AC S3	11.52	4.894	.817	.671	.895
AC S4	11.40	5.057	.802	.675	.901
Scale Manager Knowledge Cronbach's Alpha là 0.928					
AC M1	11.84	5.802	.840	.728	.905
AC M2	11.93	5.510	.852	.734	.899
AC M3	11.86	5.406	.834	.714	.905
AC M4	12.08	5.264	.810	.675	.915
Scale Information System Cronbach's Alpha 0.944					
AC N1	11.81	5.753	.861	.747	.928
AC N2	11.85	5.599	.895	.810	.917
AC N3	11.81	5.641	.875	.777	.923
AC N4	11.90	5.844	.831	.691	.937
AC N5	11.81	5.753	.861	.747	.928
Scale Communications Climate Cronbach's Alpha 0.937					
AC C1	19.70	13.835	.832	.726	.924
AC C2	19.57	14.460	.849	.752	.922
AC C3	19.53	14.722	.825	.713	.925
AC C4	19.56	14.840	.803	.674	.927
AC C5	19.73	13.899	.809	.695	.927
AC C6	19.61	14.505	.778	.658	.930
Scale Knowledge Scanning Cronbach's Alpha: 0.948					
ACK2	19.94	14.189	.805	.685	.942
ACK3	19.87	14.172	.822	.710	.940
ACK4	19.94	13.945	.834	.717	.938
ACK5	20.03	13.960	.839	.732	.938
ACK6	20.00	13.785	.866	.769	.934
ACK7	19.97	14.145	.871	.790	.934
Scale Bank's Product Innovation Cronbach's Alpha: 0.923					
SP1	15.77	9.612	.814	.694	.904
SP2	16.06	9.571	.696	.525	.928
SP3	15.76	9.573	.810	.708	.904
SP4	15.78	9.278	.842	.748	.898
SP5	15.85	9.112	.854	.757	.895

tor analysis method used is principal components with varimax rotation and breakpoint when extracting eigenvalue=1 factors. The scale is accepted when the total variance extracted is equal to or greater than 50% and the factor weight is 0.50 or more. The KMO and Bartlett's Test results get the KMO coefficient of $0.862 > 0.05$; Barlett test results have $\text{sig} = 0.000 < 0.5$, showing that factor analysis is appropriate with research data.

TABLE 3: TWO FACTORS ATTRACTED FROM EFA

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	16.285	67.855	67.855	9.219	38.411	38.411
2	1.053	4.389	72.245	8.120	33.834	72.245
3	.953	3.969	76.214			
4	.674	2.808	79.021			
5	.626	2.607	81.629			
6	.567	2.362	83.990			
7	.460	1.915	85.906			
8	.356	1.482	87.388			
9	.318	1.326	88.714			
10	.297	1.238	89.952			
11	.270	1.124	91.075			
12	.255	1.064	92.140			
13	.230	.960	93.100			
14	.221	.921	94.021			
15	.206	.859	94.880			
16	.199	.828	95.708			
17	.180	.750	96.458			
18	.157	.653	97.111			
19	.149	.620	97.731			
20	.129	.537	98.268			
21	.117	.487	98.754			
22	.110	.457	99.211			
23	.102	.427	99.638			
24	.087	.362	100.000			

Extraction Method: Principal Component Analysis.

After meta-analysis of EFA in the correlation between all 24 analyzed variables, 2 factors representing 24 variables were extracted. Two factors extracted include: Knowledge Scanning, and Communication system (Networks and Climate). These factors are further used in regression analysis to determine the impact level of each factor.

B. Regression

The linear regression model used is suitable because the results of the model test through the F test and in the ANOVA test show that sig and ANOVA are 0, so there is enough evidence to reject the hypothesis H_0 and conclude that the regression model is statistically significant. The results also show that the model has a satisfactory fit ($R^2 = 0.551$), the model explains 55% of the variation of the bank's product innovation capacity. The results of the regression are as follows (Table 4).

Table 5 indicates the overall fit of the model ($F=143.900$, $\text{Sig} = 0.000$). Based on the regression model, it shows that the bank's ability to innovate products is affected by two factors: Knowledge Scanning, and Communication system (Networks and Climate). In which, knowledge Scanning is the most influential factor ($FAC1-1$) ($b_1 = 0.562$), followed by Information system (Networks and Climate) ($FAC2_1$). ($b_2 = 0.490$). Therefore, hypotheses are supported with a significance level of 1%. Other components of knowledge absorption capacity, such as employee's capacity, manager's capacity, have no impact on the bank's ability to innovate products.

V. DISCUSSION AND CONCLUSION

At commercial banks in Vietnam, product innovation is reflected in many different aspects. Through the survey results on product innovation in the past 3 years conducted at the bank from employees and managers at the bank, the overall assessment shows that banks have performed very well in this activity. The bank's product innovation activities are reflected in the two most appreciated criteria: improving the quality of products and adding more functions to the

TABLE 4: THE MULTIPLE REGRESSION OUTPUT

Model	Coefficientsa									
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
	B	Std. Error				Beta	Zero-order	Partial	Part	Tolerance
(Constant)	-2.123E-016	.044		.000	1.000					
FAC1_1	.562	.044	.562	12.809	.000	.562	.644	.562	1.000	1.000
FAC2_1	.490	.044	.490	11.187	.000	.490	.593	.490	1.000	1.000

a. Dependent Variable: FAC1_2
 b. Independent variable: Fac 1_1: Knowledge Scanning; FAC 2_1: Information System

		FAC1_2	FAC1_1	FAC2_1
Pearson Correlation	FAC1_2	1.000	.562	.490
	FAC1_1	.562	1.000	.000
	FAC2_1	.490	.000	1.000
Sig. (1-tailed)	FAC1_2	.000	.000	.000
	FAC1_1	.000	.500	.500
	FAC2_1	.000	.500	.500
N	FAC1_2	234	234	234
	FAC1_1	234	234	234
	FAC2_1	234	234	234

products, which are common practice in most banks. However, the cost reduction and completely new product design compared to other product innovation activities are not being carried out. So, this activities can be noted to increase the bank's initiative in innovation.

Research results showed that knowledge absorption had a positive effect on bank's product innovation in the Vietnamese context. The Vietnamese commercial bank's product innovation will be increase if banks do the following:

First, The Bank needs to strengthen its capacity to absorb knowledge from the outside through: testing new technologies; execute new business opportunities; increase investment in research and development activities; compare yourself with the best bank in the industry to study; and learn from customers and suppliers

Second, Banks need to strengthen the exploitation of knowledge sources from within: increase access to new technology for the bank's employees and administrators, and train and foster them to have technology knowledge; enhance the ability to solve technology problems; have the ability to make appropriate decisions; and learn to improve professional knowledge.

Third, strengthen the sharing and exchange of innovation knowledge between departments in the bank. Innovative knowledge will only be truly valuable if it is widely shared and applied. Therefore, commercial banks also need to pay attention to encouraging and promoting the process of sharing knowledge internally. (1) Channel of transmission via intranet, electronic library, forum, public social network or internal social network. (2) Direct channel through various

TABLE 5: THE FIT OF THE MODEL (ANOVA TABLE)

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	129.255	2	64.627	143.900	.000b
Residual	103.745	231	.449		
Total	233.000	233			

a. Dependent Variable: FAC 1.2 Bank's product innovation
 b. Predictors: (Constant), FAC2.1, FAC1.1

types of training, seminars, seminars, meetings, conferences... (3) Communication channel through contests, exams, important events for employees... (4) Communication channel through newsletters, internal press. (4) Other non-formal channels such as exchanges, discussions, talks... among employees.

Fourth, the bank needs to establish a smooth information system, enhancing the effectiveness of internal communication. Banks need to generate an environment where members of the bank often support each other to share knowledge openly. Banks need to set up communication channels between departments, promote regular communication between departments and strengthen a culture of trust, carry out activities to connect members in the bank, so that they realize they are part of the Bank, have attachment and connection.

This study provides an important contribution to the innovation literature, shedding light on whether knowledge absorption enhance product innovation new product in Vietnamese commercial bank's. Our analysis indicates that Knowledge Scanning and Information System guarantee an increase product innovation capabilities of the bank.

Indeed, only in the presence of absorptive capacity do collaborative innovation networks improve innovative capacities. In other words, the degree of absorptive capacity determines how much collaboration with outside parties promotes innovative capabilities. In other words, when the level of absorptive capacity rises, the impact of collaborative innovation networks on both product and process innovation capabilities improves. Information systems and knowledge scanning are significant determinants of bank product innovation. For scholars and practitioners, our findings have a variety of significant theoretical and management consequences.

Besides the achievements, this study also has some limitations. Firstly, due to the indirect measurement method through the survey, it is subjective of the survey participants, more limited than statistical data according to the evaluation criteria of the objectivity of the data. Whether. Second, because the survey respondents' responses depend on their awareness and understanding of this issue, they may be biased, affecting the research results. Third, research data is collected in time for the current 3-year process evaluation, so there may be no limitation on the evaluation results. To overcome these limitations, future studies can analyze and collect statistical data according to the criteria for evaluating the results of the bank's innovation implementation.

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