

The Role of Technological Innovation In Achieving Competitive Advantage: A Sample Study of Algerian Commercial Banks

دور الإبداع التكنولوجي في تحقيق الميزة التنافسية في البنوك التجارية دراسة حالة عينة من البنوك التجارية

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Received: 27/07/2023

Accepted: 26/09/2023

Published: 06/01/2024

Abstract :

This study aims to find out the extent to which technological innovation contributes to achieving competitive advantage at the level of Algerian commercial banks, by applying samples of commercial bank members in the state of Saida, collecting data and trying to identify the role of technological innovation in creating and supporting the competitive position of these commercial banks.

Keywords: technological innovation, competitive advantage, commercial banks, Algeria

JEL Classification Codes: L66, M10, M15, O55

الملخص :

تهدف هذه الدراسة إلى معرفة مدى إسهام الإبداع التكنولوجي في تحقيق الميزة التنافسية على مستوى البنوك التجارية الجزائرية، ومن خلال إسقاط الاختيار على عينة مكونة من 54 فرد من عمال وإطارات مجموعة بنوك تجارية وباستخدام برنامج SPSS الطبعة 22 تم التوصل إلى تأكيد الدور الكبير للإبداع التكنولوجي في خلق ودعم المركز التنافسي لهذه البنوك.

كلمات مفتاحية : الإبداع التكنولوجي، الميزة التنافسية، البنوك التجارية

تصنيفات JEL: L66, M10, M15, O55

1. INTRODUCTION

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In light of the transformations witnessed by the global economy, from a rapid trend towards liberalizing foreign trade and openness towards global markets, and with increasing competition in a dynamic competitive environment as a result of the development of information technology, the need for institutions of all kinds to upgrade and work on development has increased, especially from the point of view of technological progress aimed at creating a competitive advantage that guarantees superiority. The institution, and this is through paying attention to the factor of technological innovation in practical reality, which is a fundamental pillar, a strategic choice and a strong incentive to exert more effort to innovate and renew work, as well as the initiative to create innovative new products and services of high quality, to face various potential disruptions in the market and adapt to changes in the environment in the economic field, and accordingly, the Algerian commercial banks as an institution to enhance its competitive advantage must embody technological innovation within the institution's environment.

In this sense, the **problem** raised in this context is as follows:

-How can technological innovation contribute to giving Algerian commercial banks a competitive advantage?

-Sub questions:

- What is the relationship between technological innovation and competitive advantage?

- What are the factors that limit the ability of banks as an institution to technological innovation?

-Does technological innovation contribute to enhancing the competitive advantage of commercial banks in the state of Saida?

-basic hypothesis:

There is a complementary and interactive relationship between technological innovation and achieving the competitive advantage of Algerian commercial banks.

Sub-hypotheses:

We will try to reveal their validity by studying the commercial banks in question. These sub-hypotheses are as follows:

1-There is a statistically significant effect between technological creativity and the strategy of discrimination in the commercial banks under consideration.

2-There is a statistically significant impact between technological creativity and lower cost strategy in the commercial banks under consideration

3-There is a statistically significant impact between technological creativity and the focus strategy of the commercial banks under consideration.

2.the concept of technological innovation

Technological innovation is considered one of the most important basic competitive pillars to adapt to the surrounding changes, by presenting everything that is new to the institution, including the market, and excelling in production in light of the intensification of competition between institutions (El Sawy, Bowles, 1997, p.76), and what has increased the importance of the need of all the institution to avoid the risk of disappearance and regression. Before addressing in this research paper the concept of technological creativity, we will first discuss the definition of creativity as a major variable in the study, and we will also explain the relationship between it and innovation and invention, then the methods of generating creative ideas.

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2.1. Definition of creativity

The use of the term creativity goes back to the Austrian economist **Joseph Chumpeter** who defined it as: "using resources in a good way with the aim of creating new goods and services." As for the researcher **Peter Drucker** he defines creativity as: "a change in the output of resources, in other words, it is a change in the value and satisfaction resulting from the resources used before consumer". (Fadila, 2017, p.25)

2.2. The relationship between creativity, innovation and invention

There are several terms overlapping with the concept of creativity such as innovation and invention, so we tried to distinguish between them as follows:

- **Innovation**: The relationship between creativity and innovation is an integrated relationship, if creativity is an intellectual process that brings new and unfamiliar ideas by an individual or group, then innovation is emerging and based on creative ideas that are considered the pillar and foundation in the innovative process. (El Karim, 2022, p.10)

- **Invention**: It is the technical solution to a problem, while creativity is the economic application of the invention. Intangible resources such as time and the overall progress in science are the most important in the invention. The researcher **Crawford & Benedet** believes that managers consider invention as "the unique dimension in the form, formulation, and employment of things, and it takes a short time, while creativity transforms the invention into a product, and it may take a long time. : (Kosseck, Young, Gash, 1994, p.37)

We see that invention is part of the creativity process, and that creativity becomes an invention in the stage of application." (El Karim, Ibidem, Loc.Cit)

3. Techniques for generating creative ideas

There are many methods that the organization can adopt to obtain new creative ideas that help embody creativity, and among these methods are the most adopted due to the ease in which they are:

3.1. Brainstorming (generating ideas):

A method that relies on generating many ideas through a group of participants, and it is a discussion circle through which a solution to a specific problem is sought by collecting and restricting all the spontaneous ideas emanating from them, and the first to come up with this method is the thinker Alex Osborn. The brainstorming includes a minimum of 06 people and a maximum of 12 people, and it goes through a set of steps as follows:

-**Get alternatives and ideas** :Invite everyone who has experience to a meeting, and the more experiences the better, where the meeting leader defines the problem and invites the members to propose alternatives with the need to collect the largest possible number of solutions regardless of their quality, and the leader is keen to encourage suggestions and protect their proposals from others, and all this is with the aim of Exciting the mind of the participants. : (Rahmouni, yildizoglu, 2011, p.27)

-**Solution Alternatives Technique and Ideas** :Explaining the meaning of solutions and grouping similar ones into groups, while encouraging new suggestions and excluding the impossible from solutions.

- The leader serves as a link and encourager for the participating group members, and he is the one who summarizes the solutions. (Zaarour, 2021, p.31)

-**Choosing and defining a plan of action** :

-Reducing the number of group members and keeping those directly related to the problem.

- Comparing alternative solutions, identifying their advantages and disadvantages, choosing the most appropriate alternative, and determining its application method.
- The leader directs the discussion to choose the most appropriate alternative.

3.2.Six thinking hats

A method that has been widely accepted due to its ease of application. It presents six ways of thinking and calls for not programming the human mind in one style only. His way of thinking is colored by only one pattern, and this way belongs to the researcher. Edward Bono ” He divided it into six hats:

- white:** responsible for gathering information and knowledge of the current situation and the surrounding problems, i.e. the objective view of things.
- Red:** It is related to feelings, that is, the person who wears it says only what he feels about a suggestion, without mentioning the reasons, as it is related to emotion, intuition, and instinctive thinking.
- Green:** It provides us with creative ideas, alternatives, options and possibilities, and it is responsible for suggestions, making it the hat of new ideas and creative thinking.
- blue:** Its main task is to help control and reach decisions and anticipate results, control the thinking process.
- Yellow:** responsible for logic, benefits and showing the value of things, it is the positive logic hat.
- Black:** the hat of pessimism and caution, and it is thought in order to know the problems and weaknesses, it is the hat of negative thinking.

Table (1): The Six Hats and Thinking Styles

hats	thinking patterns	comments
The white hat	neutral thinking	It is characterized by objectivity and is based on questioning in order to obtain facts and figures
the Red Hat	emotional thinking	It is based on deep feelings, as well as intuition.
green hat	Creative thinking	It's growth, change, and breaking out of old ideas.
blue hat	Holistic oriented thinking	It is outlook thinking.
yellow hat	Positive thinking	It is based on the Positive Evaluation Line and is a mixture of optimism and a desire to see things through
black hat	negative thinking.	It is based on the logic of criticism and pessimism, and it is always in one negative line.

4.Definition of technological innovation

Before addressing the definition of technological innovation, it is worth mentioning the concept of technology, which means the science of skills or the arts. By definition, it is defined as the effective and effective organization and use of human knowledge and experience, through highly applied means. Accordingly, technological innovation is defined by the researcher **Blom Aker** as: “a set of scientific, technical, organizational, financial and commercial steps, including

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investments in new knowledge, which lead to the implementation of new and technically improved processes and products. This is what makes us say that technological innovation is a creative intellectual process that brings new ideas Unfamiliar, and that improving them requires highly specialized competencies, and calls for the use of advanced methods and modern technologies. (Zawawi,2018, p.13)

4.1. Characteristics and importance of technological innovation

Among the most important characteristics of technological innovation are the following:
- Technological innovation should be related to production and productivity, as any innovation that does not lead to improving the production process or the use of production elements, not even providing new products or improving existing ones is not considered technological innovation in the proper sense. (Hajjaj,2015, p.104)

-Technological innovation is characterized by continuity with the application of new recognized technical knowledge, in addition to the inevitability of providing significant resources, whether financial to support research and development laboratories and effective marketing organizations, or human resources as it needs a significant group of specialized competencies in terms of their formation, technical knowledge and accumulated experience.

-Technological innovation is a key factor in competition, without its spread in the markets, the market will be limited in effectiveness and efficiency.

-Technological innovation must be characterized by the ability to discover and seize opportunities, and it is based on a new reading of needs and expectations and a creative vision to discover the new market.

4.2. Technological innovation motives and indicators of its measurement

Among the most motives that lead the institution to achieve technological innovations, is to achieve profit for the institution and strengthen opportunities in order to increase its market share and bear the risks associated with that, and these motives are summarized briefly as follows:

- **Intense competition in the market:** In order for institutions to maintain their current market position and try to improve it, they must meet the needs and desires of consumers in the best possible way, so you find institutions investing in technological innovations for production methods so that they can introduce new products that satisfy the needs of consumers, and enhance the organization's competitiveness.

- **The scientific and technological revolution:** which led to the almost immediate application of research results, design and quality improvement, as the period between reaching the results or discoveries and embodying them in the form of products became very short in light of the scientific revolution.

- **The possibility of production in large volumes:** This means large amounts of profits and a greater reduction in costs as a result of dividing fixed costs by a larger number of units, and then the possibility of selling at competitive prices.

- **Government facilities and assistance:** provided to support technological innovation processes, whether in the form of technical or financial assistance.

- **Social responsibility:** Due to the existence of overlapping and mutual relations between institutions and their employees, institutions have become living in a more aware and flexible reality, and are working to increase their contribution to supporting and improving the conditions and capabilities of their employees by adopting activities that support creativity, especially technological creativity, so that they work to develop their creativity based on

being part of the social aspect in which the institution is located, and these improvements are known as social responsibility (Haines, Petit, 1997, p.17)

4.3 . Definition of competitive advantage

Competitive advantage is defined as an element of the institution's superiority that is achieved if it follows a specific strategy for competition. Competitive advantage is also defined as the ability of the institution to formulate and implement strategies that make it in a better position relative to other institutions in the same activity.

Competitive advantage is divided into two types:

-The lowest cost advantage: It is represented in the institution's ability to design and market the product at the lowest possible cost compared to the costs of competing institutions, which leads to greater returns.

-Distinguished Advantage: It means the company's ability to provide a unique and distinct product

5.A field study of a sample of commercial Al-Bonak in the state of Saida

4.1./Study population and sample

The study population consists of a group of commercial bank employees at the level of the state of Saida, such as the National Bank of Algeria, the Popular Loan, the Local Development Bank and the Algerian Gulf Bank, with different ages, academic qualifications and professional experience, and the questionnaires were distributed according to what indicates to the table

Table (2): Distribution of the study sample

data the bank	questionnaires spreader	questionnaires retriever	questionnaires Unrecoverable
BNA	20	17	03
CPA	16	16	00
AGB	07	07	00
BDL	15	14	01
Total	58	54	04

4.2. Analyze the results of the field study

Cronbach's alpha coefficient was used, as the quantitative stability coefficient was estimated at (0.939), as shown in the following table, which indicates the validity and reliability of the questionnaire.

Table (3): Alpha Cronbach's questionnaire validity and reliability

Alpha Cronbach	number of elements
0,939	54

-Discuss the results of the study :

In order to analyze the results of the study and determine the trends of the respondents' answers, we used the arithmetic means and standard deviations, where the degree of the respondents' evaluation of the phrases and paragraphs of the study was divided as follows:

- 1 to 2.33 low rating.

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- From 2.34 to 3.66 average rating.
- From 3.67 to 5 high rating

6. Studying and analyzing the technological innovation variable within the business

To analyze the responses of the study sample on the axis of technological innovation in commercial banks in the state of Saida, 22 phrases were adopted, as shown in the following table:

Table (4): Evaluation of the technological innovation hub within the commercial banks

Phrase	SMA	deviation normative	Evaluation
Bank employees have the necessary knowledge to perform their duties in the best way.	4,4074	0,71424	
Bank employees have communication skills in order to convince their customers.	3,8704	1,06481	
The Bank treats all its clients in a single manner with respect and appreciation.	4,0185	0,96134	
The continuity and success of the bank depends on satisfying customers through the creative performance.	4,0741	0,74863	
The bank works to provide all supplies that support efficiency and excellence.	3,7037	0,94429	
The bank develops the competencies and skills of the working individuals to achieve creativity and excellence.	4,0370	0,95093	
Individuals working in the Bank share knowledge through what the old employees provide in terms of necessary experiences for the new employees.	3,7593	0,95038	
The Bank has competencies capable of providing creative solutions to problems related to their business.	4,0185	0,85761	
The bank bases its services development on customer complaints and opinions.	3,6852	0,88646	
The Bank runs class programs that help the employees to understand the management work.	3,7778	1,04008	

The Bank encourages the use of new methods and technology to develop new services.	4,1296	0,80203	
The Bank ensures continuous improvement of IT software and hardware.	4,0000	0,80094	
The Bank's management resorts to relying on technology to improve the benefit and quality of the products and services provided.	3,8704	0,82522	
Financial technology helps diversify electronic banking services and achieve each of the financial, marketing and regulatory goals.	4,0185	0,65849	
SMS messages help customers to inquire about their banking transactions.	4,0556	0,78708	
The information technology used contributes to group coordination via (e-mail, conferences and remote meetings) while shortening the time to complete operations and reducing operating costs	4,0185	0,71350	
The bank has a cartoon website to communicate with various dealers and provide services to customers	4,0185	0,78885	
Training courses are organized using information technology (training and e-learning).	3,7778	0,81650	
The technological means available in all the Bank's activities are at the level required to achieve excellence	3,6852	0,94817	
The information technology available to the bank's employees facilitates rapid communication with customers	3,8333	0,92655	
Modern technologies and electronic devices enable the provision of services with high efficiency	4,1481		0,81048
The bank seeks to improve the service provision processes by designing and developing maintenance systems in the event of a malfunction of work equipment.	3,9259	1,02519	
The axis of technological innovation	3,9469	0,86462	

The evaluation of the study sample for this axis received high approval ratings because its arithmetic mean exceeds the value of (3.94), which expresses high approval ratings

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according to the Likert scale, and therefore the study sample of commercial banks in Saida agree with a high degree of questions asked to them related to technological innovation. With an arithmetic mean approximately equal to (3.95), and a standard deviation of (0.86), which is the amount of dispersion of the sample's answers at the arithmetic mean (3.95). Based on the foregoing, the level of evaluation of the respondents for the axis of technological innovation was high.

7. Studying and analyzing the variable of competitive advantage within commercial banks in the state of Saida

In order to analyze the responses of the study sample on the axis of competitive advantage in the commercial banks in the state of Saida, 16 phrases were adopted as shown in the following tables:

Table (5): The response of the study sample towards the lowest cost

the test paragraphs	SMA	deviation normative	Evaluation
When reducing the costs of the service provided, the bank contributes to increasing customer satisfaction.	3,9259	0,82332	
The bank is always keen on innovation and development of ways and means to reduce costs.	4,0000	0,78619	
Work to reduce the cost while maintaining the foundations of excellence compared to other banks.	4,0000	0,78885	
The Bank seeks to reduce the costs of its services through technological innovation without compromising the quality of service.	3,9259	0,98415	
Reducing the service collection deadlines by the bank is considered the basis of the competitive advantage.	4,2037	1,02109	
weighted arithmetic mean.	4,0111	0,88072	

We note that the evaluation of the study sample for this axis received high approval ratings because its arithmetic mean is (4.01), which expresses high approval ratings according to the Likert scale, and therefore the study sample of commercial banks in Saida agree with a high degree of the questions asked to them related to the lowest cost strategy , with an arithmetic mean approximately equal to (4.01), and a standard deviation (0.88), which is the amount of dispersion of the sample's answers at the arithmetic mean (4.01).

Based on the foregoing, the level of evaluation of the respondents for the least cost dimension was high.

Table (6): The response of the study sample towards the focus

the test / paragraphs	SMA	Deviation normative	Evaluation
The bank focuses on meeting the needs and desires of customers in a timely manner.	3,9259	0,968400	
The Bank focuses on providing its services to a specific sector	4,0000	0,971290	
The bank focuses on maintaining its reputation and brand in front of the customer.	4,0000	0,931620	
The bank focuses on technological innovation to facilitate the process of granting real estate loans to private individuals.	3,9259	0,948720	
The Bank focuses on providing travel and assistance insurance services abroad.	4,2037	0,761820	
weighted arithmetic mean.	4,0111	0,91637	

We note that the evaluation of the study sample for this axis obtained high approval ratings because its arithmetic mean is equal to (4.01), which expresses high approval ratings according to the Likert scale, and therefore the study sample of commercial banks in Saida agree with a high degree on the questions asked to them regarding the focus strategy , with an arithmetic mean approximately equal to (4.01), and a standard deviation of (0.92), which is the amount of dispersion of the sample's answers at the arithmetic mean (4.01).

Binary Correlation Coefficient, Coefficient of Determination, and Multiple Linear Regression Equation: After examining the influence relationship between the independent variable technological innovation and the dimensions of the dependent variable competitive advantage, we will test the main hypothesis and reveal the relationship and role of the independent variable on the dependent variable.

Table (7): Evidence of the first sub-hypothesis table

Form summary

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There is a statistically significant effect between technological innovation and discrimination strategy in the banks under study.	correlation coefficient	The coefficient of determination	value F	Significance level
	0,641	0,411	36,327	0,000
	Estimation of model parameters			
		B	Significance level	
	Constant	2,052	0,000	
	Discrimination	0,492		

Through the above table, we note that there is a statistically significant positive effect of technological innovation in achieving competitive advantage through the discrimination strategy, and since the level of significance is equal to (0.000), which is less than (0.05), then we accept the null hypothesis, and reject the alternative, and the value of the square Correlation (interpretation or determination coefficient) refers to (41.1%) of the variation in achieving technological innovation for competitive advantage through the discrimination strategy. The value of the binary correlation coefficient for discrimination amounted to (0.641), and through the values contained in column B, the value of b0 is equal to (2,052) and the value of the independent variable represented by creativity is equal to (0.492). This means that the increase in achieving the competitive advantage by (41.1%) is due to the degree of increase in technological innovation.

Table (8): Evidence of the validity of the second sub-hypothes

Form summary				
There is a statistically significant effect between technological innovation and the lowest cost strategy in the banks under study	correlation coefficient	Coefficient of determination	Value F	Significance level
	0,580	0,336	26,325	0,000
	Estimation of model parameters			
		B	Significance level	
	Constant	2,197	0.000	
	The lowest cost	0,436		

Through the above table, we notice that there is a statistically significant positive effect of technological innovation in achieving the competitive advantage through the lowest cost strategy, and since the level of significance is equal to (0.000), i.e. less than (0.05), we accept the null hypothesis, and reject the alternative hypothesis, and the value of the square Correlation (interpretation or determination coefficient) refers to (33.6%) of the variation in achieving technological innovation for competitive advantage through the lowest cost strategy. The value of the binary correlation coefficient was (0.580), and through the values contained in column B, the value of b0 It is equal to (2,197) and the value of the independent

variable represented in technological innovation is equal to (0.436). This means that the increase in achieving competitive advantage by (33.6%) is due to the increase in technological innovation.

Table (9): Evidence for the validity of the third sub-hypothesis

Form summary				
There is a statistically significant effect between technological innovation and concentration strategy in the banks under study.	correlation coefficient	The coefficient of determination	ValueF	Significance level
	0,611	0,374	31,008	0,000
	Estimation of model parameters			
		B	Significance level	
	Constant	1,892	0.000	
	the focus	0,524		

The results of the table indicate that there is a statistically significant positive effect of technological innovation in achieving competitive advantage through the focus strategy, and since the level of significance is equal to (0.000), which is less than (0.05), then we accept the null hypothesis, and reject the alternative hypothesis, and the value of the correlation square (interpretation or determination coefficient) refers to (37.4%) of the variance in achieving technological innovation for competitive advantage through the concentration strategy and the value of the binary correlation coefficient in relation to concentration amounted to (0.611), and through the values contained in column B, the value of b0 It is equal to (1,892), and the value of the independent variable represented in technological innovation is equal to (0.524). This means that the increase in achieving competitive advantage by (37.4%) is due to the increase in technological innovation.

9. CONCLUSION

Through our field study at the level of a group of commercial banks, it is evident that there is a strong and morally influential relationship between both technological creativity and technology on achieving competitive advantage. which requires the banks in question to pay greater attention to this aspect in order to ensure their sustainability and survival, This answers the problems of our study and emphasizes that technological creativity has a positive impact on competitive advantage in order (Discrimination, lower cost, concentration) to come first with 41, 1%, followed by focus second by 37,4%, then last ranked the lowest cost by 33, 6%. In conclusion, Algerian commercial banks have significant challenges to the ability to compete with international banks. The first challenge lies in the imperative of embracing technological creativity to achieve competitive advantage and enhance market standing. Because the results of our field study confirm that there is a fair and positive correlation between the two variables.

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