Pak. j. life soc. Sci. (2024), 22(2): 11184-11198 E-ISSN: 2221-7630;P-ISSN: 1727-4915

Pakistan Journal of Life and Social Sciences
www.pjlss.edu.pk

https://doi.org/10.57239/PJLSS-2024-22.2.00847

RESEARCH ARTICLE

The Impact of Technological Innovation on Competition Strategies in the Technological Sector

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ARTICLE INFO

Received: Aug 24, 2024

Accepted: Nov 1, 2024

Keywords

Technological innovation
Competition strategies
Technological sector

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ABSTRACT

This study aims to explore the impact of technological innovation on competitive strategies in the technology sector, focusing on three main axes: cost reduction, differentiation, and focusing on a specific market segment. The research shows that technological innovation enhances the competitive cost advantage by reducing production costs, which contributes to enhancing companies' ability to compete with larger institutions. Differentiation also contributes to creating brand loyalty by offering innovative and unique products and services, which gives companies the ability to charge higher prices. Innovation also enables companies to direct their products towards specific consumer categories, thus enhancing their chances of success in better meeting the needs of these categories. The study concludes that technological innovation contributes effectively to supporting companies' competitive advantage, and recommends the need to encourage a culture of innovation in technology institutions and provide an infrastructure that supports continuous development efforts.

INTRODUCTION

In the current digital era, technological innovation has become a major driver of change and transformation in various economic sectors, especially in the technological sector where this sector is witnessing rapid and successive developments, forcing companies to adopt innovative competitive strategies to stay ahead.

Technological innovation is one of the most important pillars in building the competitive advantages of enterprises. If the latter do not want to lag behind in the competitive race , they must take steps and procedures to provide products or develop new technologies to produce those products with confidence and at low cost.

Technological innovation has an impact on competition strategies (whether by focusing on costs or focusing on discrimination). If the organization innovates technologically in order to focus on costs in order to obtain a competitive advantage in the target market , it must use all new technical methods in the production process.

The same applies to the institution that carries out technological innovation in order to focus on distinguishing its products in the target market, and in order to achieve this, it must use all the characteristics, innovative designs, and different working methods and techniques (Boutlaa,2008).

Research problem:

With rapid developments in technology, the technology sector is one of the most competitive. Technological innovation and new technologies increase companies' opportunities for excellence and innovation, but they also raise new challenges in the face of competition, as the question arises of how technological innovation affects competition strategies in the technology sector.

Research questions:

Key question: How does technological innovation contribute to competition strategies in the technological sector?

Research hypotheses:

The main hypothesis: " Technological innovation has an impact on competition strategies in the technological sector at a significance level of 0.05."

The main hypothesis has the following sub-hypotheses:

The first sub-hypothesis: Technological innovation has an impact on the cost leadership strategy at the significance level of 0.05."

Second sub-hypothesis: Technological innovation has an impact on the discrimination strategy at the significance level of 0.05."

The third sub-hypothesis: Technological innovation has an effect on the concentration strategy at the significance level of 0.05."

Research objectives:

The study seeks to achieve the following objectives:

1. Analyze the relationship between technological innovation and competition strategies.

2. Helping the technology sector to know and realize the role and importance of technological innovation in raising the competitiveness of the sector.

3. Propose solutions and recommendations in order to adopt technological innovation that supports competitiveness.

Importance of research:

- Theoretical importance: Employing the scientific knowledge that the study will reach in the service of technological sectors and enriching libraries on researching the impact of technological innovation on competition strategies in the technological sector
- Practical importance: Applying the results of the study and employing its results in improving the applications of technological innovation and its impact on competition strategies in the technological sector.

THEORETICAL FRAMEWORKS OF THE STUDY

First: The Concept of Technological Innovation

The concept of innovation has included technological and non-technological innovation, including organizational and marketing innovation , and as a precise definition of the concept of technological innovation, it has been defined by the following definitions:

- Technological innovation: is the creation or acquisition of an idea or knowledge, and its introduction into the organization, which may materialize in the form of a new product, process, or method (Camelo, 2000).
- It is also known as: the introduction of a new set of basic factors of production into the production system, including new products, new technologies, new markets, new materials and new formulations (Chen, 2014).
- He also defined technological innovation: It is the reuse of existing knowledge and perspectives and the creation of new knowledge that has the potential for practical application in the development of new products or processes, and then marketing and benefiting from them(Carson, 2020)

Technological innovation is the process by which organizations manage and implement the design and production of new goods and services, regardless of whether they are new to their competitors, countries, or the world, and is the result of an interactive process of knowledge generation, dissemination, and application.

As a comprehensive and inclusive definition , technological innovation is the creation or integration of new or improved technology or a combination of technologies with the aim of meeting the need of the market or anticipating current and future needs.

By reviewing and analyzing previous studies and theories, we concluded that technological innovation (Tödtling,2009):

1. An interactive process that depends on several factors, including knowledge, the market, networks, and effective operations within the organization, managing these interactions, and providing the environment and tools necessary for their success.
2. It is an inevitable process due to the advancement of technology and the need to find new technology.
3. The success of technological innovation depends heavily on the market.

Second: Competitive Strategies:

Organizations cannot operate in isolation from their competitors, and they cannot continue in the market if they proceed from the idea of satisfying the needs and desires of consumers only without taking into account the goods and services provided by their competitors to satisfy the same needs. Therefore, the organization must develop a strategy to advance and stay ahead of its competitors.

Regarding the definition of competitiveness , management scholars have not agreed on a specific definition , as some define it as the ability of an organization during a certain time to resist its competitors, and it is defined as the ability to supply consumers with products and services more efficiently and effectively than other competitors (Daoudi,2007).

In the same context, it is defined as the organization 's ability to meet the different desires of consumers, through quality goods and services through which it can reach markets at the right time and at the right price, that is, meet the needs of customers more efficiently than other institutions (Al-Tai,2009).

As for the competitive strategy, it is defined as "a complete set of actions that lead to a continuous advantage over the competitor" (Morsi, 2022). The ultimate goal of any competitive strategy is to use or change the rules of competition in line with the interests of the institution on the one hand, and to control it more than other competitors on the other hand.

General Strategies for Competing:

These strategies were developed by economist Porter with the aim of achieving better performance and obtaining competitive advantages that ensure that the organization outperforms its competitors, and include: cost leadership strategy, differentiation strategy, and focus strategy (Peter, 1997).

1. Cost **leadership strategy: Cost** leadership strategy means achieving total cost leadership through a set of functional policies that result in a significant reduction in total costs , focusing on the cost of production inputs compared to competitors(Rekabi,2004).

2. **Differentiation strategy:** An organization can create for itself a distinctive competitive position by creating a high degree of differentiation for its products from those offered by competitors.

3. **Concentration strategy**: It is difficult to find consumers with the same characteristics, so the organization must divide the market into a number of sectors and ensure that there is a reasonable degree of similarity between the consumers of each sector, and the organization must focus on a specific sector, which provides better and more successful transactions (Al-Zaher,2009).

Indicators to measure competitiveness in organizations:

The organization's competitiveness indicators fall into four indicators: profitability, cost of manufacture, productivity and market share.

أ. **Profitability:** Profitability is defined as: a concept that refers to every economic activity in which material, human and financial capabilities are used. Profitability is considered a sufficient indicator of the current competitiveness of the organization. This indicator reflects in one way or another the effectiveness of the institution's performance and activity and the optimal utilization of its resources. In addition , high profits also represent a good source of funding for the institution and allow it to develop its activities. If the profitability of an enterprise that wants to stay in the market extends for a certain period of time , the present value of the enterprise's profits is related to its market value (Saleh,2002).

Cost of manufacture: According to the theoretical model of fair competition, a company is uncompetitive if the average cost of its manufacture exceeds the market price of its products. This is due to either a drop in the price of its products due to either low productivity or expensive factors of production, or both. The decline in productivity is explained by the inefficiency of management, all of this in the case of the activity sector with diversified products. However, if the activity sector contains homogeneous products, this may be due to the fact that the average manufacturing cost is low compared to competitors (Al-Najjar, 2002).

Total factor productivity: The total factor productivity or growth of several companies can be compared at the national and international levels, and their growth can be attributed either to technical and technical changes and downward cost movement or to economies of scale. The growth index is also influenced by differences from prices based on marginal cost , and poor productivity can be explained by less effective management or an inefficient degree of investment, or both(Brika,2010).

Market share: It is possible for an enterprise to make profits and capture a large share of the domestic market without being internationally competitive, and this happens when the domestic market is protected by barriers to international trade. National institutions can also make profits at the moment but are unable to maintain competition when trade is liberalized, so the costs of the institution must be compared with the costs of its international competitors. When there is a balance that increases benefits within a sector of activity, that is, homogeneous production, the weaker the marginal cost of the enterprise compared to the costs of its competitors, the larger its market share and the more profitable the enterprise, assuming the other things are equal.

Third: The Impact of Technological Innovation on Competition Strategies

The impact of technological innovation on competition strategies is represented by its impact on cost, differentiation, focus(Qureshi,2010):

1) Impact on Costs:

Successful technological innovation is revolutionizing the structure of competition, by lowering fixed production costs, lowering barriers to entry and creating the opportunity for new, smaller firms to compete with larger ones. In this case, the company should focus its efforts on research and development for product development and process development for cost reduction, rather than on creating a high-cost product that does not guarantee success. Because in light of the fierce and free competition, it happens that institutions race to design products so that they are easy to manufacture by reducing the number of component parts of the product and reducing the time required to assemble the parts, which helps to raise the level of labor productivity and reduce the cost of unit productivity (Al-Najjar, 2002).

2) Impact on Discrimination:

The distinction in goods and services that a company achieves through technological innovation can protect it from its competitors to the extent that it creates brand loyalty among customers. Brand loyalty is a source of strength because it protects the company in all markets. Outstanding producers can impose price increases, and this is because customers are willing to pay exceptionally high prices. Brand discrimination and loyalty contribute to creating entry barriers for other companies seeking to enter the same industry(**Wahbi**,2000).

3) Impact on Concentration:

Technological innovation enables organizations to focus their efforts on a specific segment of consumers by focusing on innovation in product lines, product innovation, or in a specific market in order to fully meet their needs and desires. The organization then completes the process of selecting a specific segment of the market and moves towards a focus strategy through the differentiation method or the low-cost method. When the organization uses the low-cost focus method , it enters into competition and confrontation with the leading company in terms of cost.

Finally, we find that organizations that adopt the concept of focus tend to successfully develop products of outstanding quality because of their knowledge and experience in the target field. In addition, it can be said that an organization that focuses on a limited set of products will have a much faster process of technological innovation than a product that adopts a differentiation strategy, but the products offered by this organization are targeted to a specific segment of the market(**Mahdi**,2000).

Applied aspect of the study

1. Research population and sample:

The study population consists of all employees working at Pal Technology for Web Services in Palestine, and the study sample was randomly selected from among these employees. They numbered 50 employees, and 40 valid questionnaires were retrieved to exclude 10 questionnaires due to the lack of information in them.

2. Search variables:

- Independent variable: (technological innovation)
- Dependent variable: (competition strategies of cost leadership, discrimination, focus)

3. Tools Used:

The questionnaire was used as a study tool, where a questionnaire was designed that included paragraphs about the dimensions of the study (independent and dependent) that were directed to the research sample.

Identify research tests:

The following analyses and tests will be used:

4. Arithmetic averages and standard deviation.

5. Cronbach's alpha test to confirm the stability of the study instrument.

6. Simple linear regression testing to validate hypotheses.

Presentation and discussion of conclusions:

The questionnaire consists of two axes. The first axis contains the demographic questions of the employees of the administration of non-profit organizations, such as gender, age, and number of years of experience. The second axis includes the dimensions of the independent variable and the dependent variable.

The first axis: The qualitative characteristics of the sample members according to the following:

In terms of gender:

Table (1) Characteristics of the demographic sample in terms of gender

		Frequency	**%**
Gender	Male	**25**	5.
	Female	**15**	|||UNTRANSLATED_CONTENT_START|||37.5 %|||UNTRANSLATED_CONTENT_END|||
	Total	**40**	**100%**

Source: Prepared by the researcher based on the SPSS statistical package program

The data presented in the table shows the proportions of males and females in the studied sample, as the percentage of males is 62.5%, while the percentage of females is 37.5%.

In terms of age:

Table No. (2) Characteristics of the demographic sample by age

		Frequency	**%**
Building Age	25 years to 35 years	**18**	**45%**
	36-45 Years	**12**	**30%**
	More than 45 years	**10**	**25%**
	Total	**40**	**100%**

Source: Prepared by the researcher based on the SPSS statistical package program

According to the previous table, we note that the largest age group of the sample is those between the ages of 25 – 35 years, while the youngest group was those over the age of 45 years.

In terms of years of experience

Table (3) Characteristics of the demographic sample in terms of the number of years of experience

		Frequency	**%**
Years of Experience	Up to 10 years	**12**	**30%**
	From 11 years up to 20 years	**18**	45
	20 years and over	**10**	25%
	Total	**40**	**100%**

Source: Prepared by the researcher based on the SPSS statistical package program

The data presented in the table shows that the highest percentage was for those with experience from 11 to 20 years, where the percentage was 45%.

The Second Axis:

It included questions centered around the responses of the sample members of the staff. The number of questions was (20).

This questionnaire was designed on a five-point Likert scale where this scale is used when there is no significant division in the level of awareness, cognition and background of the people being surveyed.

Table No. (4) Five-point Likert scale

Score	**5**	**4**	**3**	**2**	**1**
Relevance score	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Arithmetic Mean	4.21 _ 5	3.41 – 4.20	2.61 – 3.40	1.81 – 2.60	1 – 1.80

Source: Prepared by the researcher based on the SPSS statistical package program

The hypothetical mean (3) was adopted to compare with the general arithmetic mean of the items of statements and hypotheses. This action was taken with the aim of evaluating the compatibility of the data obtained with the hypothesis of the study and evaluating the extent to which they represent the actual circumstances related to the phenomenon studied.

Stability of the study tool/Cronbach's Alpha Coefficient:

The Cronbach alpha scale is commonly used to measure the stability of the instrument used in the study, with a value between 0 and 1. The acceptable value is considered to exceed 0.60 (60%), if the value is lower, this may indicate that there is no internal correlation between the statements measured by the scale. However, if the value exceeds 0.60, it is acceptable, and the closer you get to one, the greater the degree of stability of the tool and its suitability for use, as shown in Table (5) of the conclusions.

Table (5) shows the results of the Alpha Crew Nabakh test

Variable	**The number of phrases**	**Alpha Crew Nabakh**
All survey statements	20	0.876

Source: Prepared by the researcher based on the SPSS statistical package program

From Table (5), it appears that the value of Cronbach's alpha coefficient was acceptable and amounted to 0.876. As a result, the researcher can be quite confident in the validity and reliability of the study questionnaire, allowing him to confidently rely on it to analyze the conclusions, respond to the study questions, and test its hypotheses.

Statistical significance of the mean and standard deviation of the study variables:

Independent variable: technological innovation

Table (6) Arithmetic mean and standard deviation of the technology innovation axis

#	**Term**	**Average**	**Standard Deviation**
1	The organization's products are improved based on the skills available to them.	3.45	1.377
2	The enterprise obtained a patent by producing a new product.	2.77	0.987

3	The organization seeks to introduce new products that have not previously been produced.	3.28	1.328
4	The organization regularly introduces new products to stay in the market	3.86	1.479
5	The organization allocates sufficient funds to research and development efforts in order to introduce a new product.	4.19	1.987

Source: Prepared by the researcher based on the SPSS statistical package program

Table No. (6) shows that most of the respondents tend to agree with the questions related to the axis of technological innovation, as the arithmetic averages of all the questions of the axis were between (4.19-2.77). These values indicate a degree of agreement and neutrality.

Dependent variable: Competition strategies

Cost Leadership Strategy axis :

Table (7) Arithmetic mean and standard deviation of the cost leadership strategy axis

#	Term	Average	Standard Deviation
1	The organization seeks to retain efficient elements to reduce the volume of costs.	4.13	1.932
2	The organization exercises strict control over all expenses and costs.	4.28	924
3	The organization is working to obtain price advantages from suppliers to reduce costs.	3.98	1.006
4	The organization imitates competitors' products rather than innovating to reduce costs.	4.38	1.937
5	The organization works to produce at the lowest cost to maintain its market share	4.11	1.988

Source: Prepared by the researcher based on the SPSS statistical package program

Table (7) shows that most of the respondents tend to strongly agree and agree with the questions related to the axis of the cost leadership strategy, as the arithmetic averages of all the questions of the axis are between (4.38-3.98). These values indicate a degree of strong agreement and agreement.

☒ The focus of the discrimination strategy

Table (8) Arithmetic mean and standard deviation of the axis of the discrimination strategy

#	Term	Average	Standard Deviation
1	The organization seeks to reach new markets that competitors have not reached before.	3.63	Four eighty-six.
2	The organization is working to introduce new products that are different from competitors	3.21	1.481
3	The organization is distinguished by having technologically advanced equipment and machines from the rest of the competitors.	3.89	1.880
4	The organization is characterized by achieving a greater return in the sector compared to similar institutions	3.10	301

5	The organization has a high ability to respond to changes in customer desires.	3.67	1.775

Source: Prepared by the researcher based on the SPSS statistical package program

Table No. (8) shows that most of the respondents tend to agree and neutrality on the questions related to the axis of the discrimination strategy, as the arithmetic means of all the questions of the axis were between (3.89-3.10).

☒ Focus strategy axis:

Table (9) Arithmetic mean and standard deviation of the focus strategy axis

#	Term	Average	Standard Deviation
1	The organization focuses on penetrating non-traditional markets.	3.63	1.881
2	The organization focuses its sales on a target market rather the market as a whole.	3.23	0.720
3	An organization is more profitable when it focuses on a spe market.	3.82	1.185
4	Enterprise resources allow for coverage of a specific marl segment.	3.07	1.023
5	The organization seeks to offer products with prices and c less than Competitors	3.23	958

Source: Prepared by the researcher based on the SPSS statistical package program

Table No. (9) shows that most of the respondents tend to agree and neutrality on the questions related to the axis of the focus strategy, as the arithmetic averages of all the questions of the axis reached between (4.07-3.23). These values indicate the degree of agreement and neutrality.

Hypothesis Testing

The **first sub-hypothesis**: Technological innovation has an impact on the cost leadership strategy at the significance level of 0.05."

The hypothesis was **not** tested. A simple linear regression model was used, between the independent and dependent variable as shown in the table below:

Table (10) Analysis of the variables to test the first sub-hypothesis

ANOVAa

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1.543	1	1.987	543	.000b
	Residual	11.529	39	564.		
	Total	632!	40			

a. Dependent Variable: Technological Innovation

b. Predictors: (Constant), Competition Strategies

Source: Prepared by the researcher based on the SPSS statistical package program

The table shows the analysis of variance, which is done by knowing the explanatory power of the model as a whole by means of a statistic of 10.543 F= and the significance of the arithmetic significance (Sig= 0.0000.000), which is smaller than the standard significance of 0.05 Sig=, which proves the existence of

an explanatory power of the linear regression model from the statistical side, that is, the sample as a whole is a significant function. In other words, there is a statistically significant effect between the independent study variable and the dependent variable, that is, acceptance of the hypothesis.

The **second sub-hypothesis:** Technological innovation has an impact on the discrimination strategy at the significance level of 0.05."

The hypothesis was **not** tested. A simple linear regression model was used, between the independent and dependent variable as shown in the table below:

Table (11) Variance analysis to examine the second sub-hypothesis

ANOVAa						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.869	1	.869	38.400	.000b
	Residual	8.749	39	127		
	Total	.618	40			
a. Dependent Variable: Technological Innovation						
b. Predictors: (Constant), Competition Strategies						

Source: Prepared by the researcher based on the SPSS statistical package program

The table shows the analysis of variation, which is done by science with the interpreted power of the model as a whole by statistical F=38,400 and the significance of the arithmetic significance (Sig=0.000), which is smaller than the standard significance Sig=0.05, which proves the existence of an interpreted power of the linear regression model from the statistical side, that is, the sample as a whole is a significant function. In other words, there is a statistically significant effect between the independent study variable and the dependent variable, that is, acceptance of the hypothesis.

The **third sub-hypothesis:** Technological innovation has an effect on the concentration strategy at the significance level of 0.05."

The hypothesis was **not** tested. A simple linear regression model was used, between the independent and dependent variable as shown in the table below:

Table (12) Variance analysis to examine the third sub-hypothesis

ANOVAa						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.869	1	.869	.420	.000b
	Residual	8.749	39	127		
	Total	.618	40			
a. Dependent Variable: Technological Innovation						
b. Predictors: (Constant), Competition Strategies						

Source: Prepared by the researcher based on the SPSS statistical package program

The table shows the analysis of variation, which is done by science with the force interpreted for the model as a whole by statistical F=36,420 and the significance of the arithmetic significance (Sig=0.000), which is smaller than the standard significance Sig=0.05, which proves the existence of an interpreted

force for the linear regression model from the statistical side, that is, the sample as a whole is a significant function. In other words, there is a statistically significant effect between the independent study variable and the dependent variable, that is, acceptance of the hypothesis.

CONCLUSIONS:

1- Technological innovation leads to the company gaining a competitive advantage

2- Technological innovation has an impact on cost leadership strategy
3- Technological innovation has an impact on discrimination strategy
4- Technological innovation has an impact on focus strategy

Recommendations:

1- Raising the awareness of the technological sector in Palestine of the importance of technological innovation and its role in improving competitive advantages.
2- Continuous and permanent encouragement of technological innovation, and the provision of appropriate conditions that allow the creation of competitive advantages that are difficult to imitate.
3- The need to spread the culture of technological innovation within technology companies, and to involve all their employees

Notifying them of its necessity to ensure continuity and success, focusing on developing their spirit of creativity and innovation, and training them on creative thinking methods and on absorbing modern technology through holding seminars meetings and discussions related to new ideas.

4- The need to pay attention to the quality of training programs provided by companies, and to intensify training programs interested in technological innovation, in addition to continuous guidance in this aspect.
5- Contribute to the provision of infrastructure that supports technological innovation and creativity.

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