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**RESEARCH ARTICLE**

# PREFERENCE OF MODERN TECHNOLOGICAL ACHIEVEMENTS AND INNOVATIONS IN THE MANAGEMENT STRATEGY OF THE ENTERPRISE

***,[1]Silvana Pasovska and [2]Trajko Miceski**

[1]University St.Kliment Ohridski-Bitola, Scientific tobacco institute-Prilep, Republic of Macedonia
[2]University Goce Delcev Stip, Republic of Macedonia

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**ABSTRACT**

The application of modern technological achievements and innovations should represent a priority in building the management strategy of enterprises. This implies constant modernization of production, introduction of new and sophisticated technologies, innovation of products, services, and modernizing the overall process of working. In the context of the treated topic, an empirical research was completed, which stated that the surveyed enterprises, the involvement of the new technology and innovations in the management strategies is inadequately perceived by the managers and the employees. That also shows the calculated value of $x^2$-test and the coefficient of contingency, with which the general conclusion is that the surveyed companies do not pay enough attention to the introduction of new technology in the process of production and innovation of the existing product or introducing a new product. In the thesis, a theoretical and empirical research is made, whose results are shown, accrual, tabular and graphical.



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## INTRODUCTION

Any enterprise to achieve sustainable growth and development, must pay special attention to the technology and innovation in its operations. Technology as a set of theoretical and practical knowledge, skills, has a strong contribution to the development of products and services, their creation, delivery and use. Technological changes are the contributing factor of competition. Many companies today have been developed thanks to that they skillfully and timely used the benefits of the technological changes. Undoubtedly, the innovation with the technology is one of the key factors of competitiveness at the level of national and international business. After all, the competition has become imperative for the survival and prosperity of any enterprise of any kind of business in all countries. In this context, the performed empirical research has shown that the involvement of the new technology and innovations in the management strategies to achieve competitive advantage is inadequately perceived, by the specified number of surveyed managers and employees, also according to the given statements and according to the calculated value of the $x^2$-test and the coefficient of contingency. For this reason in this thesis, special attention is paid to the interpretation of the importance of technology and innovation as one of the most important factors of influence on the survival and development of enterprises as well as their representation in the management strategies of some surveyed companies.

***Corresponding author: Silvana Pasovska,***
University St.Kliment Ohridski-Bitola, Scientific tobacco institute-Prilep, Republic of Macedonia

### The importance of technology for the development and growth of the enterprise

Todays turbulent movements and globalization, cause faster and faster changes. The technology advances inexorably in the direction of change of the overall activities of the business, and thus the change of competition in the markets. Markets become unstable, the consumer demands are changing, and the survival and the development of the enterprises is threatened unless new technology and innovation is used. Proper business management, creation and use of technological innovation, is imposed as an important and complex task of any enterprise. Technology is viewed as a set of techniques and methods that expand the ability of human activities and assist its management in the processes and the products are scientific solutions, otherwise, the technology can be defined as a part of a program through which the human needs are realized (Stojanovic, Radmila 1980). The technology is present in the society in the area of material production and social affairs. It contains methods, means of work, production processes, materials, but also represents a social relationship, and the ability to organize and manage knowledge, as its useful application. The technology is included in all operations that

create new value, whether it comes to professional knowledge, processes or technology built into the equipment. (Porter and Michael, 1985) In fact, the man or the manager, depending on their needs and objectives, develop technology, focusing on the competitive environment and the market, and following them as they change. In fact, the focus is a view that sees everything that happens in the environment.

**The impact of innovation on the performance of the enterprise**

Each set of activities aimed at making changes to the appropriate production or service process, organizational structure, management, performance, activity, etc., with strong features of novelties, is an innovation. Innovation is a new product, service, process, technology created by applying their own or another's research work, discovery or knowledge, through its own concept, idea or method of its creation, that is placed on the market with the proportional value. ,, Innovation creates a resource. There is no such thing in the world as "resources", until a person did not find practical value of something in nature, and that something did not process into economic value." (Drucker Peter, 2007) In fact, today, the innovation is normal and continuous phenomenon and initiator and a major factor for entrepreneurial activity. Entrepreneurial activity is a process of assistance in which an individual or a group of individuals use an organized effort to take advantage of the favorable opportunities and to create value, and to spread with the fulfillment of the tasks and the needs through innovation and uniqueness, regardless of the resources that the entrepreneur owns. (Robins, Stephen and Meri Kolter, 2005) Innovations are a key feature of the entrepreneurship and a factor of economic development and growth of enterprises and the general economy of the country. (Schumpeter, Joseph 1939) They are expressed through: new products, new production technologies, opening new markets, introducing new resources and raw materials and a new organization of economic activity. Innovation is a process of converting an idea into practical application or realization, where there are three main components: the idea or the theoretical concept, technical performance and finalization and commercial diffusion, and thus exploitation. (Trott, Paul 2005) European Commission defines innovation as "improving and expanding the range of products and services and related markets; establishment of new methods of production, supply and distribution; introduction of changes in management, organization and working conditions of employees. (European Commission, 1995) Innovation as a feature of the organization consist in the the openness of the organization to the changes, successfully managing them and their successful acceptance. Innovation is a feature of the company that deals with the adoption of new ideas and rapid response to impulses from the environment. It is a requirement for successful functioning toward the goal of conquering the long-term business success, ie profitability and competitiveness of the organization. Specifically, the new product development of the organization brings more benefits, such as (Stošić, Biljana 2007): competitive advantage, positively changing the strategic direction, the return on the investment and profits, improving the image; strengthening of marketing / brand, attracting quality personnel, development and growth of the enterprise and so on. Enterprises that innovate, always gain competitive advantage in a particular branch while constantly seeing the new demand of the market or the potential of the new technologies.

**Necessity of developing a department for research and development in the organizations**

Each organization needs to be aware that the scientific researches and development that result in the creation of new products, new energy sources, new technological procedures, etc. Are the main driver for its development. The dependence of the modern technology, the production and the development of science becomes greater and we are able to say that there is amalgamation of science, technology and production in a single process, which is carried through the research and development department, with scientific research. Scientific research is systematic and intensive study directed to the complete knowledge of the subject of study. All researches can be divided into three main types, namely: fundamental, applicable and developmental research. (Dragan Lajović and Vladimir Vulić, 2010) The fundamental research aim to discover new laws, expansion of knowledge, scientific discovery and implementation of innovation in practice. The applied research aims to solve some practical problems, finding some new solutions related to products, processes, materials and other technology. The applied research ensures the production process with innovations or inventions and other scientific and technological information for the best possible solutions to certain problems. In the department of research and development should be applied scientifical and developmental researches as well as all professional and specialist activities that are related to the idea, the implementation of all scientific and theoretical knowledge, fundamental and applied research until the start of production. The work of the department of research and development aims to transform science and technology into innovation and its application in practice. The highest percentage is located in the enterprises, but there are companies that are specialized for this work and do that for other foreign companies. The developmental work in the organization must be followed by the tremendous economic analysis and assessments. The management of the company in this phase, decides to commercialize the invention or to introduce new technology, as well as for the investments.

**Empirical research**

In order to learn about the conditions for the application of modern technological achievements and innovations, in some organizations it is conducted empirical research through surveys and statistical data processing. The questionnaires which were consisted of 3 questions, were fully answered by 31 managers of enterprises and 103 employees in certain enterprises. The survey was conducted in February 2017. The main hypothesis of the empirical research is based on the claim that the preference of modern technological achievements and innovations in the management strategy of the enterprise, contributes to its competitive advantages, development and growth.

**Results of the processed data in research**

The answers of the surveyed respondents (managers and employees) are first grouped according to affiliation and then presented in tables and graphics. For each question, the calculation of the $x^2$-test and of the coefficient of contingency, was conducted. Summarized results of the questionnaire of the empirical research are presented in Table 1.

**Table 1. Table of the processed data on the preference of modern technological achievements and innovations in the management strategy**

| Asked questions | Possible answers | Individual answers | | | |
|---|---|---|---|---|---|
| | | Managers | | Employees | |
| | | Value | % | Value | % |
| 1. Do you prefer modern technological achievements and innovations in management strategy in your enterprise? | Yes | 25 | 81 | 59 | 57 |
| | No | 1 | 3 | 5 | 5 |
| | I do not know | 5 | 16 | 39 | 38 |
| | Total | 31 | 100 | 103 | 100 |
| $X^2 = 18,311$ | | | | | |
| 2. Does your enterprise invest in new technologies and develop new products and / or services? | Yes | 21 | 68 | 49 | 48 |
| | No | 1 | 3 | 9 | 8 |
| | I do not know | 9 | 29 | 45 | 44 |
| | Total | 31 | 100 | 103 | 100 |
| $X^2 = 8,803$ | | | | | |
| 3. Does your enterprise develop successful management strategies of new technologies and innovations? | Yes | 23 | 74 | 46 | 45 |
| | No | 1 | 3 | 12 | 11 |
| | I do not know | 7 | 23 | 45 | 44 |
| | Total | 31 | 100 | 103 | 100 |
| $X^2 = 18,221$ | | | | | |

**Table 2. Table of the answers of managers and employees to the first question**

| Asked questions | Possible answers | Individual answers | | | |
|---|---|---|---|---|---|
| | | Managers | | Employees | |
| | | Value | % | Value | % |
| 1. Do you prefer modern technological achievements and innovations in management strategy in your enterprise? | Yes | 25 | 81 | 59 | 57 |
| | No | 1 | 3 | 5 | 5 |
| | I do not know | 5 | 16 | 39 | 38 |
| | Total | 31 | 100 | 103 | 100 |
| $X^2 = 18,311$ | | | | | |

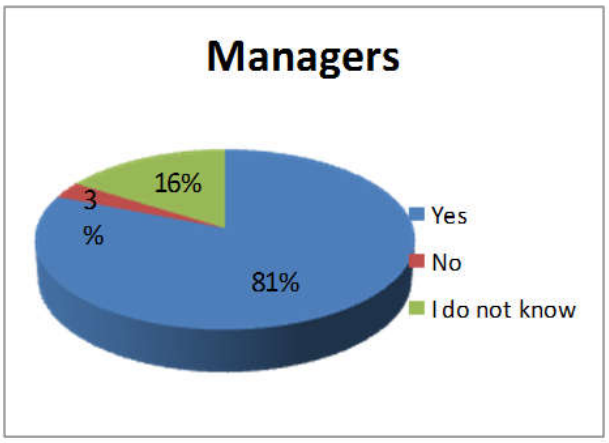


Figure 1. Do you prefer modern technological achievements and innovations in management strategy in your enterprise?

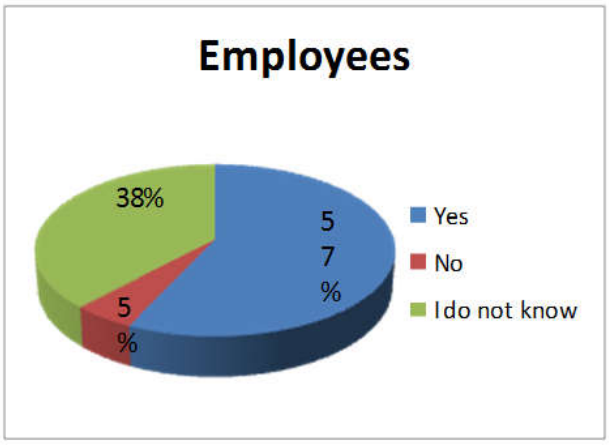


Figure 1. Do you prefer modern technological achievements and innovations in management strategy in your enterprise?

**Table 3. Table of the the answers of the managers and the employees to the second question**

| Asked questions | Possible answers | Individual answers | | | |
|---|---|---|---|---|---|
| | | Managers | | Employees | |
| | | Value | % | Value | % |
| 2. Does your enterprise invest in new technologies and develop new products and / or services? | Yes | 21 | 68 | 49 | 48 |
| | No | 1 | 3 | 9 | 8 |
| | I do not know | 9 | 29 | 45 | 44 |
| | Total | 31 | 100 | 103 | 100 |
| $X^2 = 8,803$ | | | | | |

In the process of the empirical research were used the $x^2$ - test and the coefficient of contingency (C) in order to get the desired results. Namely, the $x^2$ test or also known as Pearson's test represents the sum of the squared differences of the tested and the expected frequencies regard to the expected frequencies. It is calculated according to the following formula: (Трајко Мицески, 2009)

$$\chi^2 = \sum \frac{(f_i - f_0)^2}{f_0}$$, with the symbols (Davila, Tony, 2006)

With the help of the $x^2$ - test the relationship between the two variables has been determined, while the height of that connection we get with the help of the coefficient of contingency (C) which is calculated as follows: (OECD, Eurostat 3rd edition)

$C = \sqrt{\frac{x^2}{N + x^2}}$, with the symbols ($X^2$- calculated value for the x2 test and N – total number of frequencies)

In addition, the results for each question individually are presented tabular and graphical.

The first question was: **Do you prefer modern technological achievements and innovations in management strategy in your enterprise ?**

The results from the obtained answers to this question are shown in Table 2 and Figure 1.

The table shows that for each question are offered three possible answers: yes, no and I do not know. The respondents were able to choose only one of the answers.

Graphically this is shown as follows:

By processing the answers of the two groups of respondents after the first question and the calculated $X^2$- test and the coefficient of contingency is obtained:

$x^2_{0,05\ (calculated\ value)} = \mathbf{18,311} > x^2_{0,05\ (calculated\ value)} = 5,991$

C = 0,290

The calculated value of the x2-test (18,311) is greater than the tabulated value of 5,991 and it can be concluded that the answers of the managers and the employees vary, although in the two groups of respondents were registered over 50% positive answers, with higher expression of the managers. The coefficient of contingency has value 0,290 which shows that the intensity of interconnectedness between the answers of the managers and of the employees is very weak. It follows that the main hypothesis is incompletely filled, perhaps from the lack of awareness of the employees, the lack of commitment to the development of new technology, the weak implementation of radical innovations and so on.

The second question was: Does your enterprise invest in new technologies and develop new products and / or services?

The results from the obtained answers to this question are shown tabulary in Table 3 and graphically in Figure 2.

Graphically this is shown as follows:

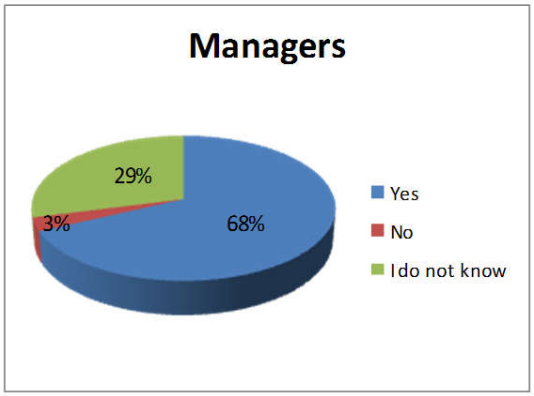


**Figure 2. Does your enterprise invest in new technologies and develop new products and / or services?**

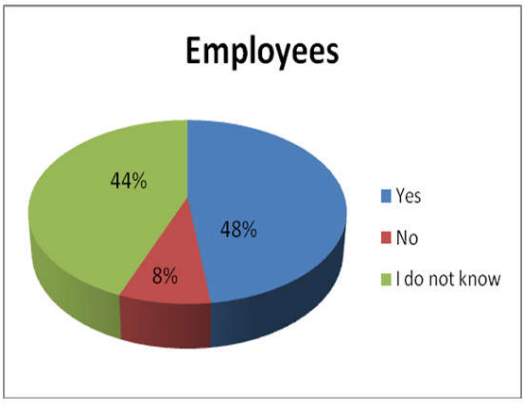


**Figure 2. Does your enterprise invest in new technologies and develop new products and / or services?**

After the calculations of the $x^2$ test and of the coefficient of contingency the following values are obtained:

$x^2_{0,05\ (calculated\ value)} = \mathbf{8,803} > x^2_{0,05\ (calculated\ value)} = 5,991$
C = 0,205

From the tabular and the graphical display, and the calculated values, can be seen that the statements of the respondent managers and employees are not identical and it can be concluded that the investment in new technologies and introduction of new products, services and production processes is still insufficient, although the statements of the managers are more optimistic. And on this issue we see that the general hypothesis is incompletely filled and that in the surveyed enterprises need greater investment in new technologies and developing new innovative products.

The third question was: Does your enterprise develops successful management strategies of new technologies and innovations?

The results from the obtained answers to this question are shown tabulary in Table 4 and graphically in Figure 3.

Graphically this is shown as follows:

After the calculations of the $x^2$ test and of the coefficient of contingency the following values are obtained:

$x^2_{0,05\ (calculated\ value)} = \mathbf{18,221} > x^2_{0,05\ (calculated\ value)} = 5,991$
C = 0,289

**Table 4. Table of the the answers of the managers and the employees to the third question**

| Asked questions | Possible answers | Individual answers | | | |
|---|---|---|---|---|---|
| | | Managers | | Employees | |
| | | Value | % | Value | % |
| 3. Does your enterprise develop successful management strategies of new technologies and innovations? $X^2 = 18,221$ | Yes | 23 | 74 | 46 | 45 |
| | No | 1 | 3 | 12 | 11 |
| | I do not know | 7 | 23 | 45 | 44 |
| | Total | 31 | 100 | 103 | 100 |

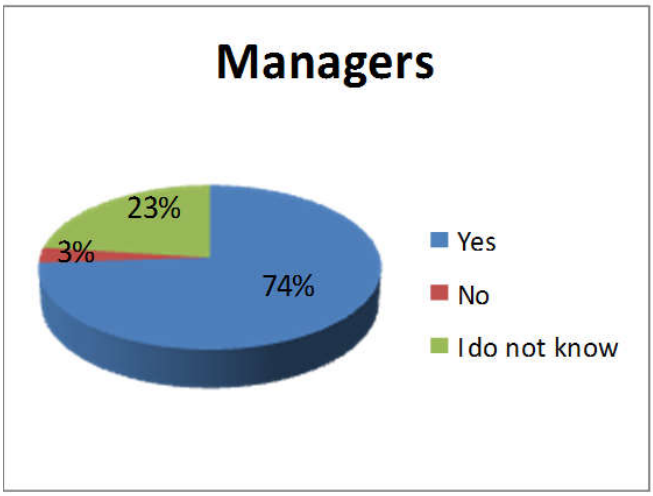


**Figure 3. Does your enterprise develop successful management strategies of new technologies and innovations?**

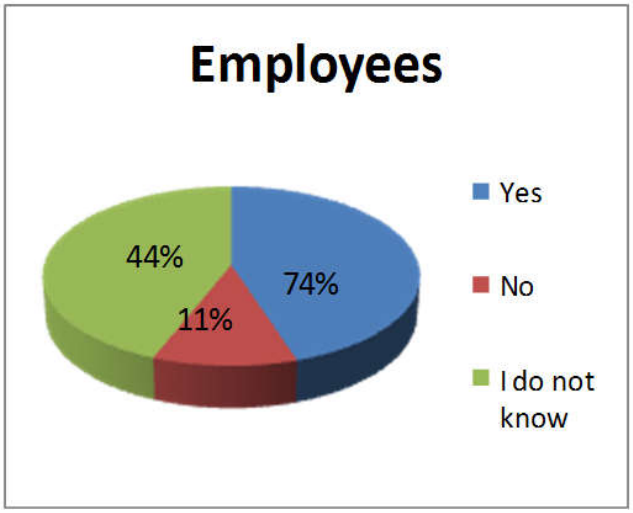


**Figure 3. Does your enterprise develop successful management strategies of new technologies and innovations?**

From the tabular and from the graphical display and the calculated values can be seen that here, the statements of the respondent managers and employees are still not adequate. The managers are giving more optimistic statements, perhaps in respect of their working in the enterprise. From the summarized results of the empirical research can be seen that the surveyed enterprises could not be distinguished by the development of technological innovation, perhaps because very few resources of its budget are allocated for research and development.

**Commitments of the enterprise for preference of modern technological achievements and innovations in the management strategy of the company**

Enterprises should seek to create management strategies to apply the existing technology to improve the existing, to replace the old technology with new or to introduce new technology and to develop new innovations. (Dragan Lajovich and Vladimir Vulich, 2010) Dragan Lajovich, Vladimir Vulich*, (2010), Technology and Inovations, Faculty of Economics, Podgorica 2010, 47 It's good the enterprise to take care of continuous introduction of radical or inter- medial innovations. These innovations result with completely new products, services or processes. They can be represented as a process that the direction of research is known, but the final result is unknown. (Davila *et al*., 2006) Any decision of the enterprise to innovate or to introduce new technology, contributes positively to development and to higher competitive position in the competitive market. (OECD 2005) The goal of any enterprise should be a continuous and stable development, success and achievement of high competitive position in the domestic and in the foreign markets. To achieve this goal, it needs to offer innovative or brand new products or high quality services, which would satisfy the high expectations and criteria of purchase. To achieve these goals, many enterprises need to invest in the establishment of special departments for research and development, whose task is to transform the theoretical and the professional knowledge into new products, services, materials. Decisions about the introduction of new or improvement of the permanent technology, should be adopted after a comprehensive and detailed analysis. Therefore, there is a need of continuous monitoring of operations, market needs and opportunities, wisely accepting the challenges and properly and timely to improve the management strategy by improving the technology and the innovation of the product, to raise quality of services and to meet the requirements of the customers.

**Conclusion**

Enterprises in order to achieve competitive advantage, it is necessary to pay attention to the process of formulating a proper management strategy with a focus on the application of modern technological achievements and innovations. This implies constant modernization of production, introduction of new and sophisticated technologies, innovation of products, services, as well as the production process in every enterprise. Goal of each enterprise is through the management strategy with the application and the introduction of new technologies and innovations in the production process or services, to influence on increasing the competitive position of the enterprise in the competitive domestic and international market. Empirical studies have shown that the surveyed enterprises did not fully pay attention to the introduction and the purchase of new technologies and launching new distinguished products. To achieve higher technological and innovative achievements, the enterprises need to allocate more funds from their budget and to develop department for research and development of the enterprise with preference for scientific and practical achievements. However the theoretical and empirical studies show that today's competitive and turbulent environment, needs constantly monitoring of the situation and continuous improvement of the management strategies through research and development, listening to the ideas of the employees and their involvement in the process of

innovation, investment in new technologies , following the latest trends, introduction of new products, services and processes.

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