

## IMPLEMENTATION AND FINANCING OF MODERN TECHNOLOGIES IN THE PRODUCTION PROCESS

**Snezana Bardarova**

Faculty of Tourism and Business Logistics  
University Goce Delcev Stip, North Macedonia  
snezana.bardarova@ugd.edu.mk

**Kiril Postolov**

Faculty of Economics  
University Ss. Cyril and Methodius Skopje, North Macedonia  
kirilp@eccf.ukim.edu.mk

*Paper presented at the 7th International Scientific Symposium „EkonBiz: Modern business in the function of the development of the national economy“, Bijeljina, 20-21st June 2019.*

**Abstract:** *This paper aims to process and demonstrate the implementation of modern production technologies and their financing. If are taken in consideration all the technological advancements from the last decade, it's clear that new, modern technologies have entered into every sphere of our existence, changing the way we communicate, learn and work. They didn't bypassed the production. Today, the production process can't be imagined without automated machines that quickly and efficiently perform the work. They are shorten the cycle time from the input of raw and materials to the output as a finished product. Further, the main component slowly becomes the Internet and all the opportunities that it offers as far as the complete coordination of the factory with all levels of management is concerned. But the implementation of modern technologies is conditioned by financing, ie investments that production companies need to make. There are many sources of funding that they can use including own and other sources. Although sometimes modern technologies can significantly reduce the company's budget, they are the main guide to the fight against competition. Without them, can't count on increasing productivity and efficiency in operations. This makes modern technologies an inevitable part of the revolution in the production of today's time for which technologies are aware both producers and consumers.*

**Key words:** *modern technology, investments, robots, improved reality, nano technology*

### INTRODUCTION

In the early twentieth century, Henry Ford revolutionized manufacturing by introducing his technology, which included “transmission line” and was used for mass production (Yamada, 2014, p199-214).

Essential resources are processed in a fixed series of steps using equipment specifically designed to produce a standardized product in very large quantities over a long period of time.

Although Ford's specialization in the factory was extreme, it had to be closed and redesigned when T-model production was completed. However, the transmission line as a technology has influenced many future generations of manufacturers and has forever changed the appearance of production.

By the end of the twentieth century, production was changing again. First, specialized, single-use mass production equipment that was characteristic of Ford's factories, was replaced with flexible machine and production tools that could be programmed more easily and perform multiple tasks at once. Because these new machines can be quickly and cheaply switched from one task to another, their use gives the company the ability to efficiently and in smaller quantities produce more different products, especially when compared to mass production. These flexible equipment and smaller quantities of finished products have led to new changes. The smaller quantities are directly related to the shortening of the production cycle and the reduction of production in progress and

inventories of finished products. On the other hand, shorter production cycles provide a faster response to fluctuations in demand.

Indeed, general strategic attention to accelerating all aspects of a company's operations is becoming more widespread. This is manifested through shorter product development time, faster order delivery, faster distribution and faster production (Dong, Yujing; 2018, p1061-1073.). Manufacturing companies adopting these new technologies and methods are different from traditional companies in their strategies. Many companies are expanding their product range, emphasizing quality, both through frequent product improvements and new product introductions, as well as through waste reduction and production deficiencies.

In any case, in new technologies, computer management is the mainstay. Starting with CAD (Computer Aided Design) or CAM (Computer Aided Manufacturing), computer construction and manufacturing are an integral part of all the technologies we know today, including the most modern.

In fact, today, production does not look nearly identical to that of twenty years ago due to technological changes. Technological changes result in faster and better communication and developed means of transport, as well as in the so-called networking of people created by the application and use of information technology (Sanaei, Movahedi. 2018, p185-196.)

Technological advances in areas such as automation and robotics have transformed the factory floor from "dark, dirty and dangerous" into "clean and high-tech" that offers efficiency, challenging and highly skilled jobs and staff. With this in mind, manufacturers are beginning to allocate more resources to invest in modern technology. They integrate into different computers, both in small and large factories.

New technologies ensure high efficiency and process intensification and can bring drastic energy savings and reduce costs in many industries. They range from those for oil refining and food production to the chemical industry. But to remain competitive, manufacturers should also be innovators.

The constant advancement of technology and the opportunities it offers require them to have the knowledge and ability to innovate. In fact, innovation is driving technology forward. Technological advancements give companies a chance to create and produce products of higher quality and more sophisticated design than before. Thanks to them, the entire production process starts and ends faster and with less cost. Also, new

technologies are developing new processes that affect the company's competitiveness in the market.

Engineers, on the other hand, are continuously working to improve existing technologies, in addition to introducing new ones. In this way, they are modernized so that they can meet all needs, keep the economy in operation and provide goods for all markets.

The advent of the Internet and its penetration into all spheres of human life only facilitates the development of modern technologies. Manufacturing companies are facing opportunities that were impossible before the internet. It is to connect the factory with all sectors of the company and create an organized community where process information is easily communicated and decisions made at all levels of management quickly and efficiently.

Moreover, machines are able to store clouds for future use and sharing. Of course, robots also take a lot of revolution in today's technology. All of these and more will be discussed below (Wang, 2017, p388-397).

## 2. Production technologies

Sinha and Noble define manufacturing technologies as "the major tools of the industry that promote the efforts of individual farmers and enable the production of finished products, co-production tools that include machines and other related equipment, their accessories and tools." (Sinha and Noble, 2008, p. 944).

This is a broad definition that includes any technical system that supports the manufacturing process. It involves any transformation of goods and any impact of technology on it, whether it is a direct influence or whether it is simply the gathering or alteration of information by any productive information technology.

On the other hand, the definition does not cover new, modern technology and how much it really is represented in production processes. New technology is seen as a small change resulting from procedures, changing equipment to fully automate the process.

The essence of advanced manufacturing technology is its use in finding ways to increase the ability to integrate or coordinate the flow of resources between inputs, transformation processes and finishing activities (Postolov, 2011, p. 112).

The field of new, modern technologies is enriched with numerous researches and modern definitions related to advanced production technologies. Noori

provides a broad definition that covers all aspects of advanced technology, encompassing the modern technologies that companies use to manufacture their products.

In particular, these technologies are in fact a computer-controlled system consisting of new production techniques and information-driven machines combined with microelectronics and new organizational practices in the manufacturing process. Although the broader concept of advanced technologies includes the so-called mild technologies such as Just-In-Time (JIT) and human resources development techniques, most authors in modern and advanced technologies include incorporating recent breakthroughs in science and engineering to help processes integrate computer technology.

There are many classification schemes in the literature in this field as well as in practice. Swink and Nair will identify three types of modern, design, process and planning technologies or administrative technologies.

According to the other authors, they can be grouped in four categories based on information processing capabilities (Kotha and Swamidass, 2000):

- *Product design technologies incorporating technologies such as computer aided design (CAD), computer aided engineering (CAE), and automation technology.*
- *Process technologies that include technologies such as computer-numerical control (CNC), computer support (CAM), flexible manufacturing system (FMS) and programmed control technologies that focus on all aspects related to the production process.*
- *Logistics planning technologies that cover technologies that control and monitor the process of transforming material from take-out from nature to distribution of the finished product.*
- *Information sharing technologies. This dimension helps to facilitate and exchange information between the above processes, products and logistics technologies.*

### **3. Advantages and challenges of applying modern technologies**

In the last 20 years, technology has completely changed the nature of production. In the past, production was done by workers without the use of any technological tools and machines.

Now that computers and technology have entered the industry, automation has become a tool for

increasing competitiveness in today's manufacturing-oriented world. Automation has allowed companies to produce huge quantities of products in record time, with increased repeatability and quality. Slowly but surely, it has become a prerequisite for the company to stay ahead of its market competition.

However, some challenges have arisen that all manufacturing companies face. Since the late 1990s, major challenges have been reducing the time from start to finish of a manufacturing process to satisfy consumers, faster completion of multiple products and their market launch, flexibility to adapt to changes in product quality improvement, cost savings and increased services. They benefit from the application of modern technology in processes.

Modern technologies contribute to strategic priorities such as increased flexibility that allows companies to produce different products in small quantities without additional costs or penalties.

In addition, advanced technologies are driving productivity gains in ways that reduce direct labor costs, as well as storage costs. Hardware and software create a routine of repetitive tasks.

Finally, through these technologies, companies achieve an increase in the quality of their products and stable production processes. Especially automated technologies provide greater consistency with specifications, while reducing waste and improving quality.

The specific benefits associated with operations and manufacturing processes can be summarized as:

- *Reduced production time - the automatic machine definitely speeds up the production process. This happens because the machine does not think, has better reproducibility in what is less likely to be human error.*
- *Increased repeatability and precision - When an automated machine is programmed to perform tasks over and over again, precision and repeatability are higher than those of workers, which may be affected by factors such as fatigue and loss of concentration.*
- *Minor human mistakes - no one is perfect and all people are prone to make mistakes. Thus, a machine that performs the same tasks all the time provides a lesser chance of mistakes that a worker might make.*
- *Reduced staff costs - The implementation of modern machines in the process means fewer staff will be required to get the job done. This means that reliability issues are reduced, leading to lower costs and financial savings. Costs that are reduced as a result of fewer employees include insurance*

*costs, salaries, bonuses and other benefits, vacations, etc.*

- *Increased reliability - machines replace people in tasks that might otherwise be dangerous and difficult to perform. This makes the whole manufacturing process more secure.*
- *Higher production volume - investing in automated equipment creates significant resources for larger quantities of manufactured products, which increases the productivity of the entire company.*

Modern technologies also bring some challenges. They refer to a price that is often very high for a company budget. Thus, the decision to invest in new and advanced technology is usually mitigated by the growth in funding from other sources and liabilities to creditors.

Improved technology also works for the creativity of employees who, thanks to new technological inventions, deviate much from the production of machines that deliver creative solutions for them. Of course, there is the loss of a job. Humans have been replaced by robots in some workplaces such as packaging.

#### **4. Financing modern technologies**

For a manufacturing company to implement modern technologies in its processes, it is necessary to have the necessary funds to enable this. Modern technologies are part of the company's fixed assets or, more precisely, they are integral parts of the equipment, so they can be provided from several sources of financing, also called capital sources. Namely, it is logical that this equipment is financed from permanent and long-term sources. This, on the one hand, ensures the continuity of the business, and on the other hand, minimizes the costs caused by financing. Accurately providing the necessary resources arises as a major funding problem for businesses as they decide to purchase equipment with modern technology. As a result, more and more foreign sources are available as:

- *Own investment - These funds are without repayment term and are considered as so called fixed capital. They usually cover all the assets that the owner or the person implementing the technology owns as part of their own fund.*
- *Family and friends - These are money borrowed from family, spouses or friends. They are a separate financing category and can also be considered their own source of financing if they are not required to return or as someone else with an obligation to repay them when a*

*company begins to achieve the benefits of modern technology.*

- *Long-term loans - A long-term loan is a relationship between a company and a bank, with which the bank gives the company a certain amount of money, and the company is required to repay the borrowed funds over a specified period, with a defined repayment scheme and interest at an agreed interest rate. Since these loans are mainly used for major projects and investments such as the purchase of equipment and the use of modern technology, they are also called investment loans. In some cases, long-term loans are also approved by manufacturers of new technology equipment so that manufacturing companies can buy it with a longer repayment period.*
- *Issuance of securities - The necessary funds can also be provided through the issuance of shares, bonds and other securities held by the company. By selling the shares, the manufacturing company agrees to give one part to the buyer who becomes its owner, commensurate with his holding in the share capital. But it was set up as an opportunity only for companies operating as joint stock companies. With the accumulated profits generated by the sale of shares, they will be able to implement the desired new technologies. On the other hand, the most common way of providing additional capital is to issue bonds. These are long-term debt securities that give the issuer the ability to repay a large amount of cash, while at the same time committing to repay the borrowed capital in accordance with the terms of the contract, together with the associated interest.*
- *Leasing - Leasing is an agreement between two parties, the company in need of new technology and a financial institution, with the leased equipment being purchased from a specialized financial institution for a fee, which must be paid within a specified period. So, it invests in modern technologies without providing additional capital.*
- *Business Angels - Although business angels are more prevalent when it comes to smaller companies that are new to the manufacturing sector, they are still a way to bring modern technology into the processes. These are individuals who want to invest in other companies and contribute to their development. They usually invest smaller amounts, most often between \$ 25,000 and \$ 100,000. In return for the investment and the risk it carries, they reserve the right to monitor the process by which modern technology is implemented.*
- *Government grants - When it comes to introducing new technologies, companies can*

apply for a grant from the state. You just need to meet all the requirements listed in the application. In the Republic of North Macedonia, the Fund for Innovation and Technological Development is in charge of this area, which continuously offers grants for financing or co-financing modern technologies.

## CONCLUSION

Manufacturers in all areas of the industry face numerous uncertainties. Figures say global demand for finished products is growing, but at a slower pace. According to the International Monetary Fund, of 3.1% in 2016, these figures are expected to reach 3.4% this year ((2017 Industrial Production of Products, Trainers, Pwc, 2017).

This weak growth in demand can be reversed by the application of modern technologies that directly affect production principles. Productivity is maximized by incorporating more machines into the process that have the capacity to produce more, with fewer errors and in less time.

The fact that fewer employees are needed in the production process leads to an increase in the economy. Herein lies one of the biggest fears of modern technology that we do not expect in the coming years. Despite the black predictions that modern technology, that is, robots and artificial intelligence will completely replace a person, there is still a gap in skills.

Namely, many economists and labor historians consider the following very important question: "Are people sufficiently qualified and able to work side-by-side with modern technology?" (<https://www.usatoday.com/story/money/2017/06/29/ai-stealing-human-jobs-isnt-problem-is/412217001/> assessed 20.3.2019.)

One thing is certain - we cannot know how today's technology development can affect manufacturing and the labor market, as well as the economy and lifestyle. Manufacturers are not only looking for a new investment, they are also looking for a new workforce.

They need to decide how to manage the huge flow of new information in order to be useful and effective. Then there's the task of adapting new technology to their already established processes, of course, finding workforce in industrial software programming, as well as building strategic partnerships and relationships.

Most importantly, manufacturers think ahead and find the right ways to adapt to any changes.

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## SUMMARY

The paper titled "Implementation and financing of modern technologies in the process of production", by the authors Bardarova and Postolov, explores a contemporary problem to the imposed need for implementation of modern technology.

The application of modern technology is because of the fact of providing efficiency and effectiveness in the functioning of the enterprises. This is a process that has been imposed and the wheel of history can't go be reversed. Or with a mathematical language it is said: the application of modern technology is an axiom in the functioning

of enterprises. Enterprises can no longer imagine their operation and functioning without technology.

In doing so, at their disposal they have different forms and types of modern technology. But also, we must see the fact that new modern technology is based on the use of information technology.

For these reasons, the authors, in the framework of this paper, are retained to a partial approach and description of the possible groups of technologies that should be applied. And with that, they absolve the question under one, for the imposed need for the application of modern technology. And secondly, from which group of technologies is required to provide.

Now we come to the next problem that companies encounter in terms of securing modern technology. The problem that arises and exists is the way of their provision, i.e. how to find resources (read cash).

Securing cash is a major problem and must be appropriately positioned and resolved.

In the practice and literature, there are many different ways of securing funds, and the authors in the last section give a suggestion how to get to them.

And well, we have provided modern technology. However, this provision and maintenance in the function of modern technology creates adequate challenges.

Of these challenges, the authors keep an indication of one of the most difficult consequences of modern technology, that's that she squeezes the worker the worker and creates social problems.

But, even though this is happening, we must conclude that this is an inevitable process, so how much we like it or not.