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Accurate forecasting, good identification of trends is the basis of business success. Strategic management methods and techniques that use experience and historical economic data are not adequate to the rapidly changing business environment. In particular, technological changes, and in particular the widespread use of ICT, forces a new approach to management style and changes in the way data is acquired on the basis of which future decisions are made. Innovation thinking, a flexible and dynamic approach to making future-oriented decisions using new technologies are the foundations of future management. Therefore, the aim of the paper is to show the role and position of technology in creating the future.

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**Keywords:** Future management, forecasting the future, new technologies

### 1. Introduction

One of the basic tasks of the manager, in addition to the day-to-day management of the organization, is to set long-term goals to guarantee the development of the organization, i.e. managing the future [13]. Traditionally, the methods used in managing the future are methods and techniques developed as part of strategic management [10]. Most of the methods used to build the organization's strategy are based on historical data as well as experience and forecasts resulting from previous practice. The low credibility and timeliness of historical data used to build the strategy and the experience gained in the current operation, allows only to modify, improve, raise some parameters of the organization's functioning but is of little use in creating innovative approaches and innovative ideas for revolutionary changes in the

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organization in the current business situation and the future functioning period. This situation is particularly visible in connection with the use of new information technologies.

It is worth emphasizing that the technological changes taking place, and as a consequence, continuous, evolutionary social changes are almost imperceptible. They are noticed until the current state is compared with the past. For this purpose, it is worth recalling, for example, the world from a very recent past Fifteen years ago, there were no smartphones, Facebook and other social media, which today create a basic way of communication that we seem to have always existed. Only thirty years ago, the emerging Internet was a tool for scientists to communicate, and few individuals and companies had personal computers. Typed on typewriters, called from telephone booths, and for information went to the library or asked wise friends, telephone information was a technical novelty. Functioning in current infrastructure and business reality is incomparable to that of several years ago. Such a drastic change in the technological environment forces other behaviors, requires a different approach to many previously performed works and activities. Hence there is a need to significantly modify the methods and style of organization management. What is more, information and communication technologies (ICT) are an indispensable element used in the organization's environment. The ability to correctly forecast changes and prepare organizations early for their acceptance and business use are now key goals of the management. Early knowledge of the future gives you a natural competitive advantage on the market. Future changes will affect the way and scope of use of ICT in the organization, and thus the way of searching for information, communication and the use of available solutions supporting effective management. Consequently, the question arises whether there is the possibility of "real" future management, i.e. forecasting development directions and preparing for the inevitable changes resulting from development, mainly technological. Therefore, the aim of the paper is to show the role and position of technology in creating the future. The article deals with selected, commonly used information technologies, the opportunities they offer and their impact on future management. Combining technological forecasting with the novel technology trends gives insight into the possibilities of new ICT - technologies and the way they may be used in the organization environment.

The paper is structured as follows: Section 2 refers to the problem of forecasting the future. In Section 3 strategic analysis in business operations is introduced. Section 4 emphasizes future trends and challenges for iot standardization. The conclusions and future works finish this paper.

2. Main assumptions of forecasting the future

We are evolutionarily adapted to the unchanging reality, so the future seems to us simply a continuation of the present. Meanwhile, the future changes that will come in the next dozen or so or several dozen years will probably be much larger in scale than those that are known to us so far and which have already changed our lifestyle and behavior. Both the speed of the changes takes place, as well as their scale and scope are accelerating significantly, which is easy to see today. Humanity did not expect or anticipate the Internet, Facebook or smartphones. Similarly, unpredictable inventions and solutions will certainly arise in the coming years, because by definition nothing can be said about unpredictable inventions and innovations. They will definitely rise and will somehow change the world. It is even difficult to forecast the direction of these unexpected changes. Any forecasting in the area of new technologies is very risky and unreliable.

Existing management models rely on the development of an organization's operating strategy, its distribution to objectives and undertaking appropriate operational activities aimed at achieving these objectives. Building a strategy is preceded by an analysis of the past and a conclusion modeled on previous experience [8]. Such a model of operation is burdened with actions from the past, both in the case of collected data, as well as methods and techniques of conduct. However, it seems obvious to deduce from the past and previous models, with a slight modification, on proven solutions. Innovation in action is very often only declarative and limited to modification of existing solutions or implementation of other solutions in current reality.

Therefore, the question arises whether there is the possibility of "real" future management, i.e. forecasting development directions and preparing for the inevitable changes resulting from development, mainly technological. The ability to correctly forecast changes and prepare organizations early for their acceptance and business use are now key goals of the management. Early knowledge of the future gives you a natural competitive advantage on the market. It is extremely difficult to be well prepared for future innovations, resulting from correctly forecasting the direction and pace of technological change. As practice shows, the guarantee of business success is far-reaching innovation that
is original in a given area and quickly accepted by the environment. The examples of new technologies mentioned above, which have achieved unquestionable business success, indicate the innovation and originality of solutions resulting from the total rejection of activities from the past.

At present, it is necessary to face the challenge, which methods and tools will allow to correctly predict future changes in technology and what is the credibility of business forecasts. Searching for adequate methods and techniques to reliably predict the future is a task for most managers who manage already existing organizations and start new business. Previous planning methods, using experience or patterns and models built on the basis of good practices, may prove to be of little use in comparison with the new reality. Competitive advantage can be achieved using the intuition, originality and innovation of solutions in conjunction with the rejection of existing patterns of action. Technological changes create a unique opportunity, but also pose a serious threat to effective management in the future business environment. Figure 1 shows main keywords related to forecasting the future, derived from the content of this paper.

Figure 1. Main keywords related to forecasting the future

When forecasting the future, it is worth paying attention to the ability to effectively manage knowledge in an enterprise, which is becoming a key factor in the knowledge-based economy [6]. The creation and dissemination of knowledge is treated as one of the most important elements determining the company's competitiveness (also called competitive advantage). In addition, this knowledge is used as a valuable resource of the organization and can be embedded in new products or technologies, and can also be treated as tacit knowledge, constituting the intellectual capital of the organization [2]. Therefore, ensuring effective and efficient knowledge management in the era of data and information redundancy is a basic issue for a modern enterprise. Having up-to-date information and skillful knowledge management has a direct impact on the quality of the decision-making process. The use of knowledge engineering mechanisms is aimed at improving the quality of decisions based on current data and knowledge [8].

Currently, knowledge management is becoming a key approach that streamlines the flow of information to and from the right sites at the right time. It is worth mentioning that knowledge exists in all business functions, ranging from purchasing, marketing or production management. Unfortunately, often knowledge can be extremely difficult to identify, capture, manage and reuse. That is why the role of knowledge management remains invaluable. So what, the knowledge resources of an organization are dispersed and often located in different places [22].
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3. Strategic analysis in business operations

At the end of the last century, when the management system changed in Poland and in Polish business reality, innovative business solutions appeared, such as e-commerce, common access to the global network, ease of creating companies and business organizations, inventiveness combined with knowledge and the ability to predict directions development. All of them gave a unique opportunity for economic success. Such situations are not a permanent element of business activity, but they undoubtedly contribute to the rapid achievement of success and benefits along with the rapid possibility of verifying your own business visions or possible failures. Under stable business conditions, these mechanisms also apply, but their verification is not so fast and the effects are not as strong and unambiguous. The key condition for successful business ventures is innovation resulting from the correct prediction of the future, derived from a good understanding of the functioning and conditions of new technologies, as well as having current knowledge.

E-business solutions used to traditional shopping methods and conducting business activities were a revolutionary change that destroyed almost all traditional trade paradigms. In the trading process, we can distinguish the following partial business processes, as shown in figure 3:

• Product promotion and marketing,
• Placing an order, purchase contract,
• Payment for the product,
• Product delivery to the buyer.
Figure 3. Partial business processes for trading process

Trade means exchange of goods, and it becomes electronic if the processes related to it are carried out electronically [11,14]. Already at that stage of technological development in Poland, the implementation of the first three processes was not a technical and mental problem for a large, rapidly growing group of users of new technologies. Promotion and marketing on the Internet, electronic orders and signing contracts, and finally the implementation of payments using electronic communication channels, was not common but available in practice. The technologically unchanging problem was the delivery of the purchased product to the customer, who was most often geographically distant from the physical location of the store, which is one of the main advantages of e-commerce. Expanding access to potential customers has always been the natural pursuit of active marketing, which by its nature offered and guaranteed electronic commerce. A new problem arose as a result of the territorial extension of the customer acquisition area and consisted of efficient delivery of the purchased product, sometimes over very long distances. Technical delivery options for a purchased product using electronic technology remained only when the purchase concerned a digital product, i.e. an electronic version of a book, film, image, ticket, information, etc. Mainly that was why sales in online stores focused on those products [8,15].

The dynamically developing e-commerce, resulting from many obvious advantages of this form of contact between the seller and the customer, required an effective solution to the problem of delivery of the purchased product to the buyer. In addition to presenting the principles and benefits of electronic purchasing process, the attention was drawn to potential new business opportunities resulting from the fact of dynamically developing e-commerce [24,25]. In this context, it is worth mentioning the main principles and benefits of electronic purchasing processes, including in particular potential new business opportunities resulting from the fact of dynamically developing e-commerce. This generates an opportunity for new business areas, consisting in the development of logistics companies that will naturally be needed to close the sales processes of material products, implemented in electronic form. This is a classic example of making good, as current practice shows, forward-looking business decisions based on observation of development trends in combination with anticipating and inferring future needs [12,13]. This situation illustrates what practical management of the future may involve, which does not modify the current reality but draws innovative conclusions from current development trends.

The use of traditional methods of data analysis for trade organizations could lead to conclusions aimed at modifying and streamlining the first three stages of trading processes using new technologies. The creation of completely new development opportunities and the needs related to delivery, which closes the sales process, does not result directly from the conducted analysis [18]. Creative thinking, innovation, creative inference resulting from a deep understanding of the features of e-commerce, allows you to draw conclusions about new business opportunities related to the analyzed area of economic activity.

For a different illustration of the situation, let's go back to the time when the horse carriage was the basic means of transport, i.e. before introducing cars to transport, and consider managing the development of a company whose main product is horse harness for driving horse-drawn carts and related accessories used in transport. The company's mission is to constantly improve products and be a leader in the production and sale of horse-drawn equipment. Strategic goals of the company would be to improve quality and improve materials and processes used for production, and improve sales channels and customer service. Despite achieving maximum performance excellence and very good results in specific areas of activity, the company that produces horse harness and accessories related to sled driving
has no chance for market expansion and implementation of its mission when road transport has appeared and popularized.

The most commonly used methods of strategic analysis operate on historical data and experience from the company's operation to date, which only allows for product improvement and improvement of operating processes in the current conditions of the business environment. The emergence of a new reality in the business environment, associated with the entry into service of cars used in transport, dramatically changes the situation and even the best-managed company producing horse harness has no chance for development. The only partial solution to the problem is the use of strategic gap testing methods [7,16].

**4. Future trends and challenges for ICT standardization**

In the past, a breakthrough technological change that had a significant impact on economic activity had the invention of the steam engine and its application in various areas of activity. This revolutionary breakthrough resulted in the need to re-evaluate many approaches in business operations. Currently, we are still in the period of another revolutionary change related to the invention of the computer and especially the global Internet network. Many areas of our lives have changed radically and are constantly changing, which causes further changes in behavior, possibilities of action and various areas of social life. Forecasting the future requires a different approach, more dynamic and adapted to new operating conditions.

The dynamic changes in ICT sector is surprising and makes the use of existing management methods ineffective. It is particularly visible on the example of methodological approaches in the implementation of IT projects, where traditional approaches give way to innovative adaptation approaches, agile methodologies derived from spiral, fast software development [21-23]. The area of IT applications functions in a particularly rapidly developing technological environment; hence changes in this area may be a pattern and direction of changes that will cover other areas of business activity. The dynamics of information technology change is impossible in any other area of the economy [26-28]. That is why the methods and techniques used in IT, initially borrowed from other sectors of the economy, were quickly adopted and modified to new conditions and are now becoming a model for widespread use.

Until now, the issue of the future in conducting a business has been an area of strategic management interest. The simple example described earlier illustrates the significant difference that exists between strategic management and future management [8,9]. In strategic management, we usually carry out a deep analysis of the past and current state of business activity in the context of its development and modification in order to increase the efficiency of future business activities [6]. It is obvious that the future is a natural consequence of the present. On the other hand, future management, based on anticipated development trends, identifies future business opportunities resulting from the observed trends, which do not necessarily relate directly to business operations, but open new fields of business activity in the future, or the need for a radical change in the organization. When thinking about the future, the most important is innovation, which is something new, different from current solutions, becomes possible, necessary, giving economic success.

Asymmetry of knowledge about business phenomena is one of the grounds for gaining competitive advantage on the market. Of course, it is about the asymmetry of having more, deeper, more precise knowledge of specific phenomena that relate to the area of activity that interests us, compared to the competition. Having additional knowledge, we can take initiatives that will allow priority in the introduction of new expected products to the market, better respond to changes in business conditions and generally gain an advantage over the competition. Greater knowledge also allows for a better allocation of resources, avoiding threats, which causes higher efficiency of operation with similar opportunities as the competition [5].

Technological changes and related social changes are currently occurring very quickly, faster and almost exponentially. The computing power of hardware increases twice every two years, the possibilities and speed of communication in providing information increase. The coronavirus-related pandemic that hit the world unexpectedly at the beginning of 2020, where isolation slowing infection and spread of the virus became the only effective way of fighting, necessitated the rapid use of ICT tools for remote communication and many other forms of applying new technologies in everyday life practice. Remote teaching, teleconferences, communication using electronic means in relations between people or citizens with offices have become a necessity of everyday life. 3D printing, treated hitherto
as a curiosity, has become one of the key ways to support the supply of hospitals with the necessary rescue equipment. Smartphone applications are used to track the pathways of the virus and quickly detect potential infections.

It is difficult to predict if the changes will be even faster, but their current pace is staggering. It is worth observing changes in technology and drawing conclusions about future applications of innovations and modifications of current principles and forms [17]. It is becoming quite common belief that many areas of life after the outbreak of the epidemic will no longer be the same as before. It is therefore necessary to anticipate the direction of changes and forecast future situations from the point of view of the functioning of society in the conditions of dynamically developing technology [4]. Figure 4 displays main terms related to future trends and challenges for ICT standardization.

![Figure 4. Main keywords related to future trends and challenges for ICT standardization](image)

New technologies change our business reality in the area of functioning, but are also useful in predicting the future and effectively supporting forecasting and planning. Artificial intelligence, machine learning, are the foundation of business intelligence (BI), whose definition given by Gartner in 2003 emphasizes that it is "... a user-oriented process of collecting, exploring, interpreting and analyzing data that leads to streamlining and rationalizing the process making decisions. These systems support the managerial staff in making business decisions in order to create the increase in the value of the company" [19].

The primary goal of business intelligence is to provide the manager with the information necessary (i.e. properly acquired, filtered and presented, often in the form of transparent graphics) to make a decision. BI allows the user to select the data he needs from one or more sources. Multidimensional analyzes and automatically generated reports are a source of business information and allow the formulation of conclusions from the phenomena observed and the basis for making appropriate and quick business decisions. The use of BI enables decision-makers to quickly provide strategic information and their transparent, condensed graphic presentation. BI contains in itself analytical tools that enable data mining, aimed at extracting knowledge from large masses of data. The development of BI tools occurs due to the need to analyze increasingly larger data sets, the so-called Big Data. Most often, the data subject to exploration is not collected specifically for specific analyzes, but is generated automatically from continuous observation of a specific place or process. An extreme case, but dynamically developed, is automatic decision making in algorithmized processes and the use of robots. This is related to the vision of Industry 4.0 (enterprise 4.0) that applies to all sectors of the economy [3].
Therefore, we are currently in a different situation than a few years ago, where the basic problem of the decision-maker was the lack of data for making business decisions regarding the future. Automation of various data collection, carried out on the occasion of ongoing processes performed for the needs of everyday life, allows the collection of large massifs of data (named as Big Data) [29]. The decision-maker problem is, therefore, not the lack of data but their enormity and the difficulty of selecting the data that is needed to make a specific decision. Systems for filtering massifs of data become useful, in accordance with the assumed criteria and a skillful way of presenting them [1]. In addition, algorithms adequate to the analyzed problem generate decision proposals or in special situations where the time to make a decision is crucial, decision-making processes are automated in accordance with previously developed variants of emergency actions [30].

An additional very important problem related to the data used in the decision-making processes is the reliability of the data on the basis of which we take actions. The methods of data collection used so far for the needs of a specific decision-making process were characterized by relatively low reliability. The basic method of collecting data, due to simplicity, is still the survey method, whose reliability is very questionable [20]. Both the construction of the questionnaire, the set of questions, the way of conducting it and the respondents themselves can mislead the decision maker through intentional answers and conclusions regarding the future. The automation of data collection resulting from natural behavior during routine processes significantly increases the reliability of the data collected in this way. Decisions made on the basis of data collected in this way are not overloaded with suggestive feelings related to the analyzed decision area.

5. Conclusions

Many areas of economic activity can still function very well according to current operating methods. New technologies affect the business environment, but in a situation where their impact on the environment in which we conduct business is small, it is sufficient to modify and adapt the activity to new economic conditions. Known and proven methods of operating and managing the organization undergo only cosmetic modification in accordance with the requirements of the business environment. New technologies, on the other hand, open up a chance for innovative business solutions, and then traditional methods of operation are inefficient and other innovative methodological solutions should be sought.

The development of the organization's strategy of operation and on its basis the planning of subsequent goals for implementation is the most commonly used style of organization management. The adopted mission, written out for partial purposes, is the basis for making all direction decisions. The question arises to what extent the adopted mission and strategy of the organization's activities and the resulting activities are current in the dynamically changing business reality. Both the data on the basis of which operating strategies were developed and the methods used relate to the past and are not updated, modified in line with the changing environment. The discrepancy between the basis for developing actions and the current and future situation, which we want to effectively manage, increases with the time perspective regarding the decisions taken. This situation causes inadequacy of future decisions taken with the current conditions of the organization's functioning. It results in the need to increase flexibility in undertaken activities, directing thinking to the future, without strongly suggesting past experience and using historical data to support your decision-making process.

New technologies provide tools that actively support a dynamic approach to decision-making processes that use more reliable data, derived from independent, automatically collected data massifs. Forecasting methods are supported by artificial intelligence, using advanced mathematical models, in developing business decision proposals in accordance with the assumed criteria and priorities. The dynamics of changes in the business environment forces dynamics and flexibility in decision-making processes. The volatility of the economic situation in current economic conditions means that traditional methods of making long-term, directional decisions become of little use and detailed planning procedures are often a waste of time. An adaptive approach, quick response to changes, innovative thinking and good understanding and use of new technologies are key factors for success in the current economic situation.
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