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INFORMATION AND COMMUNICATION TECHNOLOGIES AS A TOOL FOR INTERACTION BETWEEN STRATEGIC AND OPERATIONAL MANAGEMENT IN PRINTING COMPANIES

ІНФОРМАЦІЙНО-КОМУНІКАЦІЙНІ ТЕХНОЛОГІЇ ЯК ІНСТРУМЕНТ ВЗАЄМОДІЇ МІЖ СТРАТЕГІЧНИМ ТА ОПЕРАТИВНИМ УПРАВЛІННЯМ НА ПОЛІГРАФІЧНОМУ ПІДПРИЄМСТВІ

Alona V. Makatora

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Kyiv, Ukraine

ORCID: 0000-0001-9373-5169

Email: alona.makatora@gmail.com

Dmytro A. Makatora, Candidate of Engineering Sciences

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Kyiv, Ukraine

ORCID: 0000-0002-1909-900X

Email: makatora_d@ukr.net

Mykola A. Zenkin, Doctor of Sciences in Engineering, Professor

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Kyiv, Ukraine

ORCID: 0000-0002-8840-0572

Email: nikolay_zenkin@ukr.net

Ruslan A. Kubanov, Candidate of Pedagogical Sciences, Associate Professor

Separate structural subdivision "Institute of Innovative Education of the Kyiv National University of Civil

Engineering and Architecture", Kyiv, Ukraine

ORCID: 0000-0002-0121-4858

Email: kubanov12@gmail.com

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Мака́тора А.В., Мака́тора Д.А., Зенкін М.А., Кубанов Р.А. Інформаційно-комунікаційні технології як інструмент взаємодії між стратегічним та оперативним управлінням на поліграфічному підприємстві. Оглядова стаття.

Дослідження підтверджує ключову роль інформаційно-комунікаційних технологій та операційних стратегій у підтримці взаємодії між стратегічним та оперативним управлінням на поліграфічних підприємствах. Загальний висновок полягає в тому, що інтеграція інформаційно-комунікаційних технологій та операційних стратегій є надзвичайно важливою для ефективного управління поліграфічними підприємствами. У цілому, використання ІКТ у сфері управління на поліграфічних підприємствах грає важливу роль у покращенні ефективності бізнесу, оптимізації виробничих процесів і підвищенні якості продукції. Інтеграція систем управління персоналом, управління відносинами з клієнтами та систем планування ресурсів підприємства разом з системою управління інформаційними ресурсами підприємства дозволяє створити цілісну і ефективну систему управління, яка сприяє досягненню стратегічних цілей підприємства. Використання таких систем допомагає підприємствам бути конкурентоспроможними, забезпечує оптимізацію бізнес-процесів і позитивно впливає на його результативність.

Ключові слова: інформаційно-комунікаційні технології, поліграфічне підприємство, стратегічне та оперативне управління, бізнес-процеси, операційні стратегії, переорієнтація виробництва, стабілізація виробництва, повна спеціалізація, унікальність виробництва, диверсифікація, модифікація виробництва

Makatora A.V., Makatora D.A., Zenkin M.A., Kubanov R.A. Information and Communication Technologies as a Tool for Interaction Between Strategic and Operational Management in Printing Companies. Review article.

The study confirms the key role played by information and communication technologies and business strategies in supporting the interaction between the strategic management and the operational management in a printing company. The overall conclusion is that the effective management of printing companies requires the integration of information and communication technologies with business strategies. In general, in order to improve business efficiency, optimise production processes and enhance product quality, the use of ICT in the management of printing companies plays an important role. The integration of human resources, customer relationship management and enterprise resource planning systems with the enterprise information management system allows the creation of a holistic and efficient management system that contributes to the achievement of the company's strategic goals. Using such systems helps companies to be competitive, ensures optimising business processes and has a positive impact on their performance.

Keywords: information and communication technologies, printing company, strategic and operational management, business processes, operational strategies, production reorientation, production stabilisation, full specialisation, production uniqueness, diversification, production modification

Information and communication technologies (ICT) have become indispensable to running any business today. This is particularly true in the printing industry, where high levels of technical skills, rapid data processing and interaction between strategic and operational management are essential. Information technology can be an important link in this process. It can help the company to optimise production processes, improve product quality and ensure market competitiveness.

The ability to track all stages of production, control print quality, and access data for analysis and strategic decision-making is one of the main benefits of using information technology in a printing company. This enables the company to plan its activities effectively, taking into account the needs of the market, the technical possibilities and its own resources. The ability to automate business processes, which reduces production costs, increases labour productivity and prevents human error, is another important part of the use of information and communication technologies. For example, the work of operational management can be greatly simplified, the time required to complete tasks reduced and the accuracy of data improved by the introduction of specialised software for order management or warehouse accounting. The effective

use of information and communication technologies is becoming not only important, but a prerequisite for the success of any business, including printing, in today's environment of ever-changing markets and fierce competition. All processes require the speed and accuracy that modern ICT can provide – market analysis, production control, customer interaction.

By helping to improve business processes, reduce costs and increase competitiveness, information technology can become a real tool for successful management in a printing company. However, it is not just a question of introducing new technologies. It is also a matter of using them correctly, training staff and adapting them to the specific needs of the company. This is the only way to have the maximum impact from the use of ICT in a printing company.

Analysis of recent research and publications

In the works of Ukrainian and foreign scientists, various aspects of this problem have been studied and presented, e.g: K. Prieb [1]; O. Berezhna [2]; P. Mykytyuk [3]; A. Zerkal [4]; O. Goth, S. Bondarenko [5]; O. Dragan [6]; S. Kulakova, N. Prytula [7]; N. Pedchenko, V. Strilets, L. Franko [8]; O. Guseva, S. Legominova [9]; V. Strilets [10]; Z. Yurynets [11]; S. Belyaeva [12]; T. Vodolazhska, L. Achkasova [13]; S. Ishchuk [14]; O. Pushkar [15]; E. Mironenko, L. Byvsheva, O. Kondratenko, R. Shulin [16]; O. Kuzmin, O. Melnyk, O. Romanko [17]; T. Borisova [18]; O. Zgurska [19]; A. Azarova, O. Roik, I. Lobankina [20]; A. Zdobuzhnyk [21]; A. Filipenko, N. Reznikova, O. Rogach, O. Shnyrkov [22]; L. Bilovus, N. Yablonskaya [23]; T. Gaikova, V. Kulinich [24]; R. Magyar, V. Gadmashi, S. Dalekorey [25]; P. Krush, Y. Meged [26]; Y. Leli [27].

The aim of the article is to analyse the impact of information and communication technologies on the interaction between strategic and operational management in the context of the economic activity of a printing house.

The main part

In the modern world, information and communication technologies have become an integral part of the work of companies in various industries, including the printing industry. They allow companies to optimise their activities, to increase productivity and to improve the efficiency of managing. The interaction between strategic and operational management in printing companies through the use of ICT is particularly important. It should be noted that researchers emphasise the importance of this component of management for adapting operations to changes in the external environment, for flexible regulation, and for effectively solving the challenges faced by the company, when defining the main principles of the strategic management system in a company [28].

In this respect, there are four levels of strategy development that make it possible to manage a printing company in an effective way. The first level is corporate strategy, which is the creation and management of a product portfolio, the setting of investment priorities and the direction of the use of

corporate resources. This level allows the company to optimise its operations and to ensure that there is a balance between the strategic objectives and their practical implementation. The second level is the business strategy, the aim of which is the creation of competitive advantages in the market, the definition of the key principles of the company's activities and the selection of the optimal development strategy. This level is important to ensure that the company continues to compete effectively and to ensure that it continues to operate. The third level is the functional strategy, which is the definition of strategies for each of the company's functional units in order to achieve the company's overall strategy. At this level, the aim is to optimise internal processes and resources in order to achieve the objectives which have been set. The fourth level is the operational strategy, which is the planning and coordination of the company's operational activities in order to achieve the strategic goals. This level is important to ensure the efficiency of the production processes and the fulfilment of the tasks while keeping the costs to a minimum [3].

Let's talk in more detail about the strategic levels of development of a printing company.

At the first level, the company uses the corporate strategy to determine its position in the market, create and manage a product portfolio, prioritise investments and determine how to use resources. For this purpose, various ICT tools are used, such as customer relationship management (CRM) systems, enterprise resource planning (ERP) systems and others, which support the management of the company's processes and resources.

Corporate strategy enables a company to optimise its activities, increase its competitiveness and achieve its strategic objectives. Developing business plans, analysing data and setting strategic priorities are important components at this level. ICT helps collect, analyse and use data for strategic management decisions. In addition, ICT can help an organisation to create an effective communication environment between different departments and levels of management. This facilitates the efficient exchange of information, coordination and informed management decisions. Examples include using internal portals, email, online conferencing, etc. Another aspect of the use of ICT at corporate level is to increase the automation of business processes, allowing the company to focus on strategic tasks and reduce the time spent on routine operations. Examples include using project management systems, electronic document management, etc. [4].

Thus, printing companies can optimise management processes, increase efficiency and competitiveness, and ensure the successful implementation of strategic goals through the use of information and communication technologies at the corporate level.

The second level of management, business strategy, is key for a company as it determines its ability to achieve competitive advantage in the marketplace and ensure business sustainability [5]. Using ICT at this level allows a company to effectively define the key

principles of its activities and to choose the optimal strategy to develop.

One of the main tasks of a business strategy is to create competitive advantages. This will help the company to differentiate itself from its competitors and to maintain its leading position in the market. Information and communication technologies can be used for market, competitor and customer analysis and other research that will enable a company to identify and effectively exploit its competitive advantages. In addition, ICT helps to ensure that there is effective communication between the strategic management and the operational management of a company. This is important to ensure that strategic objectives are clearly communicated to senior management and that operational decisions are aligned with the strategic direction of the organisation. ICT also facilitates rapid decision-making based on reliable and up-to-date information, and helps to coordinate actions and plans between different departments.

At the level of business strategy, the use of ICT for planning and forecasting of business development is important. Market trends can be analysed, demand can be forecast and changes can be responded to in a timely manner using analytical systems and software tools. With the help of ICT, the implementation of strategic goals can also be monitored and adjustments can be made in the event of deviations. ICT also has a role to play in the improvement of a company's internal management processes. A company can streamline its operations by automating business processes, implementing electronic document management and other solutions. Such technologies not only reduce the risk of errors, but also speed up decision making and getting things done. ICT can also be used to manage corporate resources, including financial and human resources, in the area of business strategy. Modern resource management systems enable companies to allocate resources efficiently, control costs and optimise personnel management [1].

By using information and communication technology at this second level of governance, companies can enhance their development strategies, create competitive advantages and ensure their sustainability. Effective management, timely response to market changes and achievement of strategic goals can be achieved through the use of modern technologies.

At all levels of management, including the interaction between strategic and operational management in a printing company, information and communication technologies play an important role. The third level – functional strategy – is one of the key stages of management. This level is about the definition of strategies for each of the company's functional units in order to achieve the company's overall strategy. Optimising internal processes and resources to successfully achieve the goals set is the main objective of functional strategy.

A company can effectively plan and coordinate the activities of different functional units by using information and communication technologies at the third level of management. Modern software tools

make it possible to automate many processes. This simplifies the interaction between departments and ensures that they interact in real time.

The functional strategy also includes the implementation of monitoring and analysis systems. These systems make it possible to track targets in real time and to react to any deviations [11]. ICT makes it possible to automate the collection and analysis of data, which contributes to more informed decision making and a faster response to changes in the business environment. At the functional strategy level, supporting the development of innovation is an important function of information and communication technologies. Modern technologies make it possible to collect and process large amounts of data and to bring new ideas and products to the market quickly, thus making the company more competitive. ICT also has a role in the implementation of the company's quality management strategy. Through quality management systems and monitoring of production processes, a company can ensure the high quality of its products and services. This enables it to better meet the needs of its customers. At the functional strategy level, effective enterprise resource management systems can also be implemented using information and communication technologies. Resources can be optimised and the efficiency of the company improved by automating the processes of financial, human and material resource management [6].

Using ICT at the functional strategic level enables an organisation to effectively manage internal processes, resources and people to achieve strategic goals. The use of modern technologies allows a company to be more flexible and competitive in the market. This ensures the successful development and stability of its operations.

Operational strategy, which is aimed at planning and coordinating the company's operational activities in order to achieve strategic goals, occupies an important place at the fourth management level. This level of management development allows to ensure the efficiency of production processes and to perform tasks while minimising costs [12].

Systematic analysis of operational processes, evaluation of their productivity and development of strategies for their optimisation are part of the operational strategy in a printing company. Using information and communication technologies in this area allows automating many processes, providing quick access to the necessary information and maintaining reliable data processing. The monitoring of production processes, the control of equipment and the allocation of resources are just some of the aspects that are taken into account in a company's operational strategy. The use of ICT in this context enables an organisation to ensure the efficient operation of industrial assets. It also enables the automation of production processes and increases overall productivity. Improving product quality, optimising production processes and reducing production costs can be achieved through an effective operational strategy. The use of modern ICT has a positive impact on customer satisfaction and the company's

competitiveness by enabling the implementation of product quality control systems and the rapid identification and elimination of possible defects. Companies can also plan and forecast their production needs using information and communication technologies. The need for raw materials, consumables and resources can be accurately calculated, surpluses or shortages can be avoided and production processes can be effectively managed through data analysis and the use of specialised software. The main objectives of a company's operational strategy are to optimise production processes and increase productivity. A company can achieve high efficiency and competitiveness in the market by using different software products to plan production tasks, control their execution and manage resources.

The introduction of modern technologies in the company is necessary to reduce production costs and optimise business processes. Using ICT in the operational strategy allows the company to reduce production time, increase the speed of responding to change and become more competitive. In many ways, how successfully ICT is implemented at different levels of management determines the overall efficiency of a company. In particular, in order to achieve the objectives, set and maximise the productivity of the company, the operational strategy, as an important component of management, requires systematic improvement and the use of the latest technologies [13].

As a tool for interaction between strategic and operational management in a printing company, information and communication technologies are therefore used. The four levels of strategy development and implementation – corporate, business, functional and operational – contribute to the effective management of the company. They make it possible to optimise processes, ensure competitiveness and achieve strategic goals. Implementing information and communication technologies at each strategic level helps printing companies succeed in the marketplace and ensure sustainable development in today's competitive environment.

In the interaction between strategic and operational management of a printing company in the modern world, information and communication technologies play a key role. Using ICT allows a company to effectively plan and co-ordinate its activities to achieve strategic goals. The fourth level of management, which is determined by the operational strategy, deserves special attention. In order to optimise production processes and reduce costs, this level involves planning and coordinating the company's operational activities.

It is worth considering different operational alternatives to maximise the positive impact on the company, given the characteristics of production strategies in the printing industry. One of these alternatives is to reorient production, which may involve creating new production facilities or developing new products [14]. In the printing industry, this may lead to a change in the type of products that are produced, especially in the post-printing stage. For example, a company may introduce new technologies

in the finishing of print products, such as foiling, embossing, varnishing, etc. This will differentiate the product offering. This helps to distinguish the product range on the market and to attract customers by the originality and quality of the products [15].

Another option. Stabilising production is an important strategy for printing companies as it helps to maintain production at optimum levels and avoid unnecessary costs of developing and improving processes. In order to achieve production stabilisation, it is necessary to work on more efficient logistic schemes, to improve the processes of work organisation and to look for reserves in the production processes [16].

The introduction of digital technologies into the production process can be one of the tools for stabilising production. The company can optimise production, reduce production time and improve the quality of the result by using digital printing presses, software to automate production processes and management systems. Staff training and development is another important element in stabilising production. The skills of employees and the efficiency of production processes are improved by investing in their professional training. The development of human resources is the basis for production stability and can be a factor in the improvement of product quality and the increase of the company's competitiveness. Another important component of production sustainability is establishing effective communication between strategic and operational management. Using specialised ICT to exchange data and reports between departments helps to avoid delays and miscommunication, which can be beneficial to productivity and efficiency. Another important component of production sustainability is the need for continuous monitoring and analysis of production results. The company can keep its operations under control and respond flexibly to changes in the market by paying close attention to measuring the efficiency of production processes and finding the best ways to improve them.

Ensuring the sustainability of the production process, optimising costs and improving product quality are the overarching goals of stabilising production in a printing company. The path to this goal may be complex and require the integration of various strategic and operational approaches, but the result will be the sustainable development of the company and its successful competitiveness in the market.

Another option. Full specialisation is an in-depth strategy in which the company concentrates on the production of a single type of product. This approach gives the company the opportunity to achieve cost leadership or a special position in the market [17]. In the printing industry, this approach can be manifested through the production of long runs of products. Economies of scale play an important role in reducing production costs and increasing process efficiency.

Focusing on certain specialised publications or products, which allows the company to achieve qualitative and quantitative leadership in the chosen field, is one of the key aspects of full specialisation.

Through simplified workflows and the use of specialised equipment, it also allows for streamlined production processes and increased productivity. Total specialisation can also be an effective strategy for printing companies, provided that they have a deep understanding of, and a mastery of, the technologies and processes that are required. The company can maintain its competitive edge and ensure high quality products by using the latest equipment, software and best practices. The use of innovative technologies in a fully specialised printing company can help to optimise production processes and increase productivity. The company will maintain its competitive edge and provide a high level of customer service through the use of digital printing technologies, automated management and quality control systems.

Being fully specialised allows the company to concentrate on finding new markets and building relationships with key partners. This can ensure a steady flow of orders, build a strong reputation in the market and open up new business opportunities.

Ongoing monitoring and analysis of market trends, competitor research and the identification of potential risks are necessary for the successful implementation of a full specialisation strategy. A company can only achieve sustainable success and secure its place in the marketplace through continuous improvement and adaptation. In general, full specialisation is an effective strategy for printing companies as it allows them to gain a competitive advantage, to optimise their production processes and to improve the quality of their products. A company can successfully implement a full specialisation strategy and ensure sustainable development in the current market environment through the use of ICT, innovative technologies and the development of specialised business lines.

This strategy has great relevance. Production uniqueness is a strategy where the focus is on the production of unique products. Uniqueness can be achieved through the rarity of the products, their specific technical characteristics, the versatility of their use, etc. In order to achieve a competitive advantage in the market, management in this area focuses on ensuring the use of non-traditional materials and high-quality materials [18].

It is important to have a clear development strategy and planned resource management when producing unique products. This helps the company to retain a niche in the market, attract new customers and ensure a high level of product quality. Optimising production processes, monitoring product quality and responding quickly to market changes can be achieved by using ICT in such processes. Through innovative technologies and a creative approach to production, uniqueness can be achieved. Developing new products and using new materials can be key for companies who want to be leaders in their industry. The company's competitiveness and sustainability in the market will be increased by investing in research and development. Continuously monitoring and analysing market trends, studying customer needs and adapting to their requirements are also part of managing the uniqueness of production. The company can maintain its

competitive advantage and enter new markets through collaboration with partners and continuous product improvement. The ability to be flexible and respond quickly to market changes is essential to the successful implementation of the production uniqueness strategy. Key elements of a unique company's success are continuous improvement and innovation. Adopting new technologies and approaches will enable the company to continue to achieve high results. Ongoing quality control and improvement of production processes are also necessary for the development of unique products. The use of modern equipment and control technologies enables the company to ensure stable product quality and satisfy customer needs.

The uniqueness of the production can become a key factor in the success of a printing company, as it allows it to differentiate itself from its competitors and to offer unique products to its customers. An important tool for achieving this competitive advantage can be the use of ICT and innovative technologies. In summary, the uniqueness of production requires a combination of strategic management, innovative technologies and a creative approach to production. This can help the company to secure a competitive advantage, a stable development and a high reputation in the market of the printing industry.

In the modern economy, this is a very fashionable option. For the development of printing companies, diversification is an important strategic step. This process consists of diversifying the products produced and expanding the activities carried out in the industry. Diversification can become a strategic step in the competition on the market for powerful and structured companies that actively work on increasing the quality and price indicators of their products.

Diversifying allows the company to broaden their customer base, attract new customers and reduce risks from changing markets. Diversifying also helps companies adapt to changing markets and respond quickly and efficiently to new trends [19]. Diversifying can become the basis for a company to grow and develop in a sustainable way. To promote their diversified products in the market, leading printing companies actively use marketing strategies. Some of the methods used to promote different products in the printing market include an active advertising campaign, participation in exhibitions and conferences, and cooperation with key partners. The use of ICT, which allows companies to reach a wider audience and interact effectively with customers, also plays an important role in this process.

The strategy of diversification can include developing new products, introducing innovative technologies as well as expanding services. This approach allows companies to be more competitive and to offer a greater volume of activities in the market place. Diversifying can become a key element of a company's strategy for developing and increasing its competitiveness. The introduction of ICT in the diversification process can contribute to automating internal processes, improving customer service, as well as analysing market trends. The use of specialised software makes it possible to keep effective records

and analyse sales dynamics. This allows you to optimise your diversification strategy and respond to changes in demand in a timely manner. The ability to adapt to market changes, actively research customer needs and implement new ideas is essential for successful diversification. Continuous improvement of products and services to meet market needs is an important part of this process. In order to make informed strategic decisions, the use of ICT helps to collect and analyse large amounts of data.

In general, for any printing company seeking stable development and increased competitiveness, diversification is an important stage in its development. The introduction of ICT in the diversification process can help companies achieve this goal through the improvement of management processes, the expansion of the product range and the satisfaction of customer needs.

Finally, there is another variant of operational strategy. Changing production is a strategic and operational step in developing a printing company. The implementation of the results of research and development in the partial stages of specialisation and the creation of products with new qualitative characteristics are the main focus of this process. In this way, the company is able to maintain its competitiveness on the market, meet the needs of customers and keep pace with modern trends.

An important aspect of changing production in a printing company is the introduction of the latest technologies into production. It enables the automation of production processes, an increase in productivity and quality, a reduction in resource costs and a shortening of production times. The use of the latest technologies also contributes to the development of innovative products. This opens up new opportunities for the company's market success [10]. Changes in production also involve changes in the management and organisation of work in the enterprise, in addition to technological aspects. Optimization of production processes, improvement of the supply chain, implementation of a quality control system are just some of the areas that can be important in the context of production change. Clear strategic planning, the involvement of qualified specialists and the definition of clear objectives are necessary for the successful implementation of production change. In addition, it is important to constantly evaluate the results and adapt the strategy in line with changes in the market and consumer needs. Production change can also involve developing new products and services. It involves analysing market trends, studying the competitive environment, and responding to changes. This process allows printing companies to keep abreast of the latest technological innovations. It allows them to respond to changes in a timely manner and keep up with the times. The process of managing and coordinating work in the company can be greatly facilitated by the introduction of ICT in production change. The use of specialised software solutions makes it possible to automate planning, control and analysis processes. This helps to reduce risks and increase production efficiency.

Incorporating innovative technologies and scientific developments in the process of production change enables us to create products with high quality characteristics that meet the requirements of the modern market. Companies can remain competitive and take a leading position in the market by using the latest technologies in combination with a scientific approach. For printing companies striving for sustainable development and market leadership, production change can be a key success factor. Companies can not only survive in a competitive environment but also develop and prosper by implementing the latest technologies and scientific developments, optimising production processes and modernising the management structure.

So, let us summarise by analysing possible production strategies. In today's world, in the interaction between strategic and operational management in a printing company, information and communication technologies play an important role. The planning and coordination of activities aimed at achieving strategic objectives is facilitated by the use of ICT. The fourth level of management, driven by operational strategy, involves optimising production processes and reducing costs.

It is worth considering different operational alternatives aimed at maximising the positive impact on the business when considering production strategies in the printing industry. Strategies such as production reorientation, production stabilisation, full specialisation, production uniqueness, production diversification and production modification are worth considering. Each of these strategies has its own characteristics and can be used to gain a competitive advantage in the market place.

Undoubtedly, in order to remain competitive, develop and meet market demands, the choice of the optimal operational strategy in printing helps the company. In today's overloaded and competitive market environment, the development and effective implementation of an optimal operational strategy can be a key factor in the success of a printing company.

It should be noted that innovative production transformations in printing include maximising expenditure on research and development, increasing the range of products, creating new technological solutions and production schemes, as well as operational regulation of the production cycle and adaptation to consumer requirements. The basis for innovative changes in the organisation of printing production is the development of automation and computerisation.

In the printing industry, it is important to represent operational processes in the form of a workflow that allows you to integrate pre-press, press and post-press processes. Developing this approach simplifies processing and exchanging data and also encourages the introduction of the latest technologies in the industry. Key to the effective implementation of innovation in the printing industry are Automated Control Systems (ACS) and Corporate Information Systems (CIS). They help to optimise processes and increase the productivity of companies by providing an

integrated approach to the management of technical and economic objects [20].

As far as the types of CIS are concerned. It should be noted that ICT has an important role to play in supporting and optimising the interaction between the strategic management and the operational management of a printing company. One of the most important tools in this context is Customer Relationship Management (CRM) systems, which help to improve cooperation and interaction with customers, as well as to expand the customer base and increase customer loyalty.

CRM is not just software, but also a comprehensive strategy aimed at ensuring that customers get dealt with effectively. Modern CRM systems can collect, store and analyse large amounts of data about customers, their preferences, order history and interactions, enabling companies to better understand their customers and offer them personalised services and products. CRM helps to improve the effectiveness of marketing and sales activities by eliminating inconsistencies in company communications and responding quickly to customer requests. Through data analysis, companies can predict demand for their products, respond to changes in the market in a timely manner, and adapt their development strategy to customer needs. By using CRM, companies can also improve sales management, effectively track and analyse customer information, and automate customer service and relationship management processes. This helps companies not only to retain existing customers, but also to attract new customers and develop long-term relationships with them [7].

CRM enables companies to improve their supply chain and ensure effective collaboration with their business partners, not only by managing customer relationships, but also by optimising interactions with suppliers and partners. The large amount of data generated by CRM enables companies to create strategic and analytical reports that can help them manage their business and make informed decisions about their management.

The use of CRM in the printing industry can contribute to an increase in a company's competitiveness, an improvement in the quality of services and products, and an improvement in communication with customers and partners. A key success factor in the modern business environment, the use of effective CRM solutions enables companies to be aware of their customers' needs and to respond quickly to changes in their requirements [2].

CIS include Enterprise Resource Planning (ERP) systems, which aim to automate the accounting and management of various aspects of a business. ERP systems are corporate information systems that are built on a modular basis and cover all the key processes of a company's activities. They enable companies to effectively manage their finances, to plan and control production, to manage inventory, sales and marketing, procurement, projects, service and quality assurance procedures.

With the help of ERP systems, companies can improve their performance, optimise their internal processes and increase their productivity and costs.

They help companies to be more flexible and competitive in the marketplace by automating many routine operations, tracking performance indicators and controlling business processes. ERP systems also make it possible for companies to collect and analyse large amounts of data, which helps them to make more informed management decisions. As a result, companies can forecast demand for their products, plan production and deliveries, and respond to market trends and changing customer needs. In addition, the use of ERP systems increases the level of interaction between company departments, standardises processes and ensures their focus on the company's strategic goals. This helps to avoid duplicating efforts, improves communication within the organisation and increases internal coordination. In addition, in order to manage risk and ensure business stability, ERP systems are an effective tool. They can help preserve a company's reputation and prevent financial losses by identifying potential problems and risks in advance and responding to them in a timely manner [21].

In general, companies can increase the efficiency of the management and control of production processes, reduce costs and improve product quality by using ERP systems in the printing industry. This helps companies to be more competitive and successful in the market, which is important for them to continue to develop and grow.

An Enterprise Asset Management (EAM) system, which aims to optimise the management of physical assets and their use, is one of the most effective tools for the development of a printing company. EAM systems logically combine different aspects of a company's operations to achieve better coordination and resource utilisation. Maintenance, repair and logistics management are particularly important.

EAM systems enable companies to manage their inventory effectively, to monitor the condition of their physical assets, and to plan their maintenance and repair processes. They help increase productivity and efficiency of production processes by ensuring optimal asset utilisation. Typically, EAM modules are integrated with Enterprise Resource Planning (ERP) systems. This enables efficient interaction between different aspects of management. As a result, internal co-ordination improves and the company can operate more efficiently and effectively. It's important to note that EAM systems have their roots in computerised maintenance management systems (CMMS), which specialise in controlling and scheduling equipment repair processes. From a historical perspective, they have evolved into more complex enterprise asset management systems, which include a wider range of functions [22].

Enterprise asset management systems are an important tool for companies that want to optimise their costs, increase their productivity and improve the quality of their services. They enable companies to manage their resources in a rational way, to avoid unnecessary costs and to ensure that all systems operate in a reliable and smooth manner. EAM systems also help companies to monitor the condition of equipment, plan preventive maintenance and carry out

regular servicing, which helps to extend the useful life of fixed assets. This can help prevent unforeseen production stoppages and reduce the cost of emergency repairs. Enterprise asset management systems help to solve complex tasks of equipment management, inventory control and maintaining high efficiency of production processes and play a key role in the strategic planning of a company's activities. Their implementation contributes to the improvement of the company's competitiveness and the creation of conditions for sustainable business development.

In summary, enterprise asset management systems have a significant role in the optimisation of the management of physical assets and their efficient use. They are an important component of successful business operations, helping companies to manage resources rationally and to increase productivity and efficiency of production processes.

This is a very important tool. Computerised Maintenance Management Systems (CMMS) are designed to improve the efficiency of managing equipment and fixed assets in organisations. These systems provide records of repair requests, parts orders, and financial data related to these processes, and include a database of equipment, modules for scheduling maintenance and planned repairs [23].

CMMSs enable companies to effectively manage maintenance and reduce the risk of accidents and equipment failure by automating technical management processes and providing convenient access to the information needed. This helps to improve the reliability of the equipment and to optimise the cost of ownership. One of the key benefits of using a CMMS is that it ensures that the processes used to maintain and repair equipment are documented and systemised. This enables companies to accurately identify maintenance needs, plan work with the appropriate resources and monitor the implementation of necessary procedures to quality and safety standards. In addition, to optimise the overall management of equipment and material resources, CMMS can be integrated with other business management systems, such as an Enterprise Resource Planning (ERP) system. This integration helps improve management decision-making by increasing the interaction of information between different parts of the organisation. CMMS systems enable companies to maintain high productivity in their production processes by making efficient use of their technical resources and properly scheduling repairs and preventive maintenance. They also help to optimise costs and increase the efficiency of physical assets by allowing data on equipment condition and repairs to be analysed. The use of CMMS in printing companies not only improves maintenance and repair management, but also increases overall production efficiency, reduces equipment downtime and prevents potential accidents. This helps to reduce costs, improve product quality and increase the ability to compete in the marketplace.

In general, implementing computerised maintenance management systems in printing companies is a necessary step to ensure stable and

productive operations. These systems are an important prerequisite for market success, helping companies to manage their resources efficiently and ensure the smooth operation of their equipment.

Another important tool for production-oriented companies is Manufacturing Execution Systems (MES). These systems make it possible to solve the problems of synchronisation, co-ordination, analysis and optimisation of the production processes in the company. Their aim is to increase productivity, reduce costs and improve product quality.

MES systems help provide presence and organisation at the workstation, increase the efficiency of production lines and automating the collection and processing of production data. With the help of these systems, companies can be more flexible in response to changes in production processes and customer requirements. One of the key functions of MES is production planning and control. This includes scheduling work time and resources, monitoring tasks, and controlling product quality. These systems contribute to the optimisation of production processes, the prevention of delays and losses, and the improvement of interaction between departments.

The implementation of MES helps companies to increase labour productivity, to reduce production time, to improve product quality and to increase customer satisfaction. These systems enable efficient use of resources and lower production costs by facilitating the automation of production processes [24]. The integration of MES and ICT can be the basis for the creation of a single automated production management system in a company. This allows companies to improve the communication between all departments, to optimise the production processes, to ensure a quick response to changes and to increase the overall productivity.

In summary, MES systems, together with ICT, are important tools for companies seeking to improve production efficiency and product quality. Using them makes it possible to optimise production processes, ensure rapid response to change and increase competitiveness.

Supply Chain Management (SCM) involves planning and controlling the processes involved in procuring raw materials, manufacturing and delivering finished products. SCM systems, such as Supply Chain Planning (SCP) and Supply Chain Execution (SCE), play an important role in ensuring that the entire supply chain operates in an efficient manner [25].

SCP is responsible for developing strategic plans for the supply chain, including planning production, managing inventory and coordinating with suppliers. This subsystem enables companies to optimise supply processes. It increases efficiency and reduces inventory costs. SCE, on the other hand, provides the ability to track and monitor Supply Chain plans in real time. This subsystem makes it possible to respond quickly to changes in production processes. It ensures timely delivery of products and manages logistics processes.

The use of ICT in supply chain management enables the automation of processes, improved exchange of data with suppliers and customers, and

better forecasting of demand and management of inventories. The result is an increase in efficiency and a reduction in risk in the supply chain. Using of ICT in supply chain management systems also helps to improve communication between all stakeholders in the supply chain. This facilitates mutual understanding and quick decision-making. This enables companies to become more flexible and adapt to changing markets. Companies can improve collaboration with suppliers, reduce inventory costs, improve delivery accuracy and reduce product delivery cycle times by using ICT in supply chain management. This enables companies to be more competitive and efficient in the market.

Overall, for companies to find effective and innovative ways to optimise production and improve supply chain management, the integration of ICT into supply chain management is an important step. Using ICT in the right way enables companies to remain stable, efficient and competitive in the marketplace.

A warehouse management system (WMS) is one of the key components of logistics management in printing companies. This system enables the automation and optimisation of all warehouse management processes, ensuring efficient warehouse operations and integration with other supply chain processes [26].

WMS includes a wide range of functions for managing inventory, tracking products, optimising warehouse operations, planning product placement and much more. This system enables companies to efficiently manage inventory, increase inventory accuracy and improve inventory turns. Implementing a warehouse management system reduces the risk of loss and out-of-stocks during inventory management. It also increases the speed of response to changes in supply and demand. As a result, companies can optimise their supply chain. They can ensure smooth and efficient warehouse operations. The WMS also includes data analytics modules that enable companies to obtain detailed information on warehouse productivity, inventory costs, product placement and other key indicators. In order to optimise warehouse management processes, this information is essential for making strategic decisions.

An even more efficient and dynamic system for managing a company's logistics processes can be created by integrating the warehouse management system with other management systems, such as ERP (Enterprise Resource Planning) and SCM (Supply Chain Management). The result is an optimisation of the company's internal processes and a general increase in management efficiency. The overall impact of implementing warehouse management in a printing company can be significant. The company will be able to reduce the time and effort spent on manual operations in the warehouse, reduce warehousing costs and increase the efficiency of managing logistics. This will lead to a reduction in costs and an increase in profitability.

To sum up, a Warehouse Management System (WMS) is an important tool for optimising warehousing in printing companies. Companies can improve inventory management, increase the

efficiency of warehouse processes and ensure more accurate and efficient management of logistics processes by using ICT in this area.

HRM (Human Resource Management) is the key tool in any company's human resources department. This system automates human resource management processes and helps to solve the tasks of recruiting, training, motivating and retaining employees. Through the use of HRM, organisations can optimise the processes of human resource management and maximise its efficiency [27].

HRM includes many functions such as scheduling, tracking attendance, evaluating performance, managing personal information, managing leave, and much more. It is a system that simplifies and automates many aspects of human resource management, allowing you to focus on more strategic tasks and to analyse important employee data. With the use of HRM, companies can improve their human resources policies, ensure a clear regulation of employee relations and create favourable conditions for the development and support of talented employees. Automating and streamlining HR processes increases employee satisfaction, productivity and loyalty. Analysing HR data to provide vital information about employee performance, skills, training and development needs, and forecasting future staffing requirements is an important component of HRM. This helps to ensure that informed decisions can be made about strategic workforce planning and business development. An even more holistic management system can be created by integrating the HR system with other management systems, such as ERP (Enterprise Resource Planning) and CRM (Customer Relationship Management). This allows you to track the interaction between employees and clients, consider the peculiarities of working with different categories of employees, and generally increase the efficiency of cooperation.

In conclusion, the human resources management system is an important part of the maintenance of efficient HR processes in a printing company. Using ICT in this area allows companies to ensure effective human resources management, optimise work processes and increase employee productivity, which has a positive impact on the company's performance.

An enterprise information resource management system, or ECM (Enterprise Content Management), is an essential tool for supporting the interaction between strategic and operational management. This system automates the processes of collecting, processing and storing enterprise content. It also takes into account access rights to this content. ECM is a strategic infrastructure for the optimisation of information management at all levels of a company [8].

ECM systems consist of different modules implementing document management, digitised documents, records, workflows, web content, multimedia, knowledge and document-oriented interaction. These modules interact with each other to help structure and store a variety of information in the company, which increases productivity and ensures management efficiency.

The Enterprise Information Resource Management system allows you to optimise document workflows. It provides version control, security and library services. It also facilitates capturing, transforming and managing physical document images, long-term archiving, automating retention policies and compliance standards [9].

Particular attention should be paid to workflow management. This supports administrative business processes, the transfer of content along defined routes and the creation of audit logs. In addition, the enterprise information resource management system allows you to automate web communication, dynamic content management and user interaction. Multimedia content management, which includes the management of graphic, video and audio files, marketing and information materials, occupies a special place in the enterprise content management system. Another important function is to support systems for collecting and delivering relevant information, contributing to effective corporate knowledge management. In addition, document-centric collaboration is an important component, facilitating the sharing of documents among users and supporting project workgroups. As a result, companies can communicate, collaborate and make decisions faster. In general, to support the interaction between strategic and operational management in a printing company, an Enterprise Content Management system is a key tool. The use of ECM allows a company to optimise information management, increase productivity and management efficiency. This in turn contributes to the achievement of the company's strategic goals and its sustainable development [29].

It is important to note that in today's printing industry, the use of information and communication technologies in support of operational processes and the interaction between strategic and operational management is essential. Automated management systems and business information systems play a key role in this process. They contribute to the effective implementation of innovations and the optimisation of business processes in printing companies.

A comprehensive approach to managing various aspects of business operations is provided by a variety of corporate information systems such as CRM, ERP, EAM, CMMS, MES, SCM, WMS and HRM. These systems contribute to the optimisation of production processes, efficient accounting and resource management, increased productivity and high product quality. An important tool for introducing innovation and improving interaction between different levels of management is an Enterprise Information Resource Management system. ECM systems provide security and access to information for relevant users, and enable efficient management of different types of content.

Therefore, in order to ensure effective management and achieve the strategic goals of the company, the use of information and communication technologies and corporate information systems in the printing industry is important. The result is an increase in productivity, quality and competitiveness in the printing industry.

Conclusion

It is possible to make several generalisations from this study.

First, in supporting the interaction between strategic and operational management, information and communication technologies play a key role in a modern printing company. The four levels of strategy development – corporate strategy, business strategy, functional strategy and operational strategy – help a company to manage its activities effectively through the definition of strategic objectives, competitive advantages, the optimisation of internal processes and the planning of operational actions. Modern information and communication technologies, such as enterprise information systems, can support these levels of strategy through the efficient processing and analysis of large amounts of data, the automation of processes and the improvement of communication between different levels of management. In this way, the company can ensure flexibility, efficiency and the ability to adapt to the changes taking place in the printing industry.

Second, different variants of operational strategies in the printing industry, it can be noted that strategies such as production refocusing, production stabilisation, full specialisation, production uniqueness, diversification and production modification allow companies to achieve different goals and adapt to changes in the market. It is important to bear in mind that from the point of view of operational strategy, a company can choose a certain direction for the optimisation of production processes, taking into account the uniqueness of its product, market needs and the possibility of using ICT for the achievement of strategic goals. Each of the above strategies has its own advantages and can be used for the modernisation of a company and the enhancement of its competitiveness. Focusing on optimising production processes and improving product quality by developing and implementing optimal operational strategies, combined with the use of modern technologies, has the potential to increase the efficiency and competitiveness of printing companies.

Third, in the modern printing industry, the use of information and communication technologies and corporate information systems is key to supporting operational processes and the interaction between strategic and operational management. In this way, the introduction of innovations, the optimisation of business processes and the increase of productivity in printing companies are made possible. The variety of business information systems provides an integrated approach to the management of different aspects of the business, such as the management of production, resources, customers and human resources. The result is an improvement in product quality, optimisation of production processes and an increase in the company's competitiveness. Thus, the use of ICT in combination with business information systems allows printing companies to effectively manage information, resources and processes, which contributes to the achievement of strategic goals and increased efficiency.

In this way, the research material confirms that information and communication technologies and corporate strategies play a key role in supporting the interaction between the strategic management and the operational management of printing companies. Companies can optimise processes, manage resources

and information, and improve productivity and market stability through the use of modern technologies. In addition, companies can achieve different objectives and adapt to changes in the printing industry by using different operational strategies.

Abstract

Introduction. Information and communication technologies (ICT) have become indispensable to running any business today. This is particularly true in the printing industry, where high levels of technical skills, rapid data processing and interaction between strategic and operational management are essential. Information technology can be an important link in this process. It can help the company to optimise production processes, improve product quality and ensure market competitiveness.

The purpose of the study is to analyse the impact of information and communication technologies on the interaction between strategic and operational management in the context of the economic activity of a printing house.

Methods. analysis of literature – review of scientific publications, journals, books and other sources for collecting and analyzing information about this topic of research; system analysis – study of the object of study as a complex system with interconnected elements; deductive and inductive methods – the use of logical thinking to derive general principles or conclusions from specific facts or data; The interdisciplinary approach is the integration of knowledge, methods and practices in different disciplines to solve a certain problem. The combination of these methods ensures the quality of the study.

Presentation of the main research material. In the modern world, information and communication technologies have become an integral part of the work of companies in various industries, including the printing industry. They allow companies to optimise their activities, to increase productivity and to improve the efficiency of managing. The interaction between strategic and operational management in printing companies through the use of ICT is particularly important. It should be noted that researchers emphasise the importance of this component of management for adapting operations to changes in the external environment, for flexible regulation, and for effectively solving the challenges faced by the company, when defining the main principles of the strategic management system in a company.

In this respect, there are four levels of strategy development that make it possible to manage a printing company in an effective way. The first level is corporate strategy, which is the creation and management of a product portfolio, the setting of investment priorities and the direction of the use of corporate resources. This level allows the company to optimise its operations and to ensure that there is a balance between the strategic objectives and their practical implementation. The second level is the business strategy, the aim of which is the creation of competitive advantages in the market, the definition of the key principles of the company's activities and the selection of the optimal development strategy. This level is important to ensure that the company continues to compete effectively and to ensure that it continues to operate. The third level is the functional strategy, which is the definition of strategies for each of the company's functional units in order to achieve the company's overall strategy. At this level, the aim is to optimise internal processes and resources in order to achieve the objectives which have been set. The fourth level is the operational strategy, which is the planning and coordination of the company's operational activities in order to achieve the strategic goals. This level is important to ensure the efficiency of the production processes and the fulfilment of the tasks while keeping the costs to a minimum.

As a tool for interaction between strategic and operational management in a printing company, information and communication technologies are therefore used. The four levels of strategy development and implementation – corporate, business, functional and operational – contribute to the effective management of the company. They make it possible to optimise processes, ensure competitiveness and achieve strategic goals. Implementing information and communication technologies at each strategic level helps printing companies succeed in the marketplace and ensure sustainable development in today's competitive environment.

In the interaction between strategic and operational management of a printing company in the modern world, information and communication technologies play a key role. Using ICT allows a company to effectively plan and co-ordinate its activities to achieve strategic goals. The fourth level of management, which is determined by the operational strategy, deserves special attention. In order to optimise production processes and reduce costs, this level involves planning and coordinating the company's operational activities.

In the printing industry, it is important to represent operational processes in the form of a workflow that allows you to integrate pre-press, press and post-press processes. Developing this approach simplifies processing and exchanging data and also encourages the introduction of the latest technologies in the industry. Key to the effective implementation of innovation in the printing industry are Automated Control Systems (ACS) and Corporate Information Systems (CIS). They help to optimise processes and increase the productivity of companies by providing an integrated approach to the management of technical and economic objects [20].

A comprehensive approach to managing various aspects of business operations is provided by a variety of corporate information systems such as CRM, ERP, EAM, CMMS, MES, SCM, WMS and HRM. These systems

contribute to the optimisation of production processes, efficient accounting and resource management, increased productivity and high product quality. An important tool for introducing innovation and improving interaction between different levels of management is an Enterprise Information Resource Management system. ECM systems provide security and access to information for relevant users, and enable efficient management of different types of content.

Therefore, in order to ensure effective management and achieve the strategic goals of the company, the use of information and communication technologies and corporate information systems in the printing industry is important. The result is an increase in productivity, quality and competitiveness in the printing industry.

Conclusions. It is possible to make several generalisations from this study.

First, in supporting the interaction between strategic and operational management, information and communication technologies play a key role in a modern printing company. The four levels of strategy development – corporate strategy, business strategy, functional strategy and operational strategy – help a company to manage its activities effectively through the definition of strategic objectives, competitive advantages, the optimisation of internal processes and the planning of operational actions. Modern information and communication technologies, such as enterprise information systems, can support these levels of strategy through the efficient processing and analysis of large amounts of data, the automation of processes and the improvement of communication between different levels of management. In this way, the company can ensure flexibility, efficiency and the ability to adapt to the changes taking place in the printing industry.

Second, different variants of operational strategies in the printing industry, it can be noted that strategies such as production refocusing, production stabilisation, full specialisation, production uniqueness, diversification and production modification allow companies to achieve different goals and adapt to changes in the market. It is important to bear in mind that from the point of view of operational strategy, a company can choose a certain direction for the optimisation of production processes, taking into account the uniqueness of its product, market needs and the possibility of using ICT for the achievement of strategic goals. Each of the above strategies has its own advantages and can be used for the modernisation of a company and the enhancement of its competitiveness. Focusing on optimising production processes and improving product quality by developing and implementing optimal operational strategies, combined with the use of modern technologies, has the potential to increase the efficiency and competitiveness of printing companies.

Third, in the modern printing industry, the use of information and communication technologies and corporate information systems is key to supporting operational processes and the interaction between strategic and operational management. In this way, the introduction of innovations, the optimisation of business processes and the increase of productivity in printing companies are made possible. The variety of business information systems provides an integrated approach to the management of different aspects of the business, such as the management of production, resources, customers and human resources. The result is an improvement in product quality, optimisation of production processes and an increase in the company's competitiveness. Thus, the use of ICT in combination with business information systems allows printing companies to effectively manage information, resources and processes, which contributes to the achievement of strategic goals and increased efficiency.

In this way, the research material confirms that information and communication technologies and corporate strategies play a key role in supporting the interaction between the strategic management and the operational management of printing companies. Companies can optimise processes, manage resources and information, and improve productivity and market stability through the use of modern technologies. In addition, companies can achieve different objectives and adapt to changes in the printing industry by using different operational strategies.

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