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The Digital Economy's Use of Big Data Technologies and Data Science

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ABSTRACT

The function of Big Data technology and Data Science in the contemporary digital economy is examined in this article. According to the author, large and medium-sized businesses in the retail and service sectors have a greater interest in utilizing them. Banks, mobile operators, and major manufacturing firms actively employ these technologies (Artificial Intelligence) to evaluate data on equipment failures and minimize downtime, which enables cost-reduction. Big Data technology serves as a liquid product and a prerequisite for boosting business profitability through individualized customer care and predictive analytics. It is crucial to ensure the formation of unique data exchanges and legalize a single definition of big data for the modern digital economy.

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1. INTRODUCTION

We are currently experiencing a "digital transformation" in technology. There are computers, phones, and many other forms of technology everywhere now that they are affordable, portable, and quick. Everything is changing extremely quickly right now. The "digital" consumer is the main force behind these shifts. The demands on a product's quality, usefulness, and design are growing faster than the rate at which consumer tastes are changing.

2. LITERATURE REVIEW

The consumer now values first impressions. Consumption habits are changing, and as a result, smart device contact is becoming more prevalent. Business moves quickly, with rising demands, saturated old markets for goods and services, more rivalry, and the advent of new technical rivals. For a very long period, outdated technologies don't generate much revenue, and maintaining them costs a lot of money and resources [1].

Big Data is experiencing rapid growth on the global market. The public sector, healthcare, manufacturing, and retail are the most active data producers and users. Big Data adoption is uneven, and as users, banks are setting the pace. Insurance firms,

petrochemicals, and metallurgy might join them in the upcoming years. By 2024, analysts project that the advent of Big Data technology would have a $300 billion economic impact. The amount of data is exponentially increasing. There were 33 zettabytes of data generated by people and organizations worldwide in 2018, and there will be 175 zettabytes in 2025. Entertainment platforms, security cameras, gadgets with Internet connectivity, and productivity-enhancing solutions are the key development drivers. They all use big data to operate. The process of creating value is becoming faster and more flexible thanks to digital transformation, which also enables adaptation to the rapid pace of market change and the needs of the digital customer. This raises the bar for employee competence and their proficiency with modern project management techniques, technologies, and approaches, such as Scrum/Kanban, Continuous Integration (CI), and Development and Operations (DevOps) (UX), testing of user interfaces (UI), etc. Additionally, it entails the adoption of adaptable campaign management techniques, the elimination of hierarchy, and an improvement in the caliber of communication interactions. It is important to keep in mind that when digital transformation processes spread throughout society, it does not lag behind the broader trend. Nevertheless, it is challenging to foresee what the long-term impact of the digitalization of society and the economy would be. In this situation, choosing a shared route along which the nation's state, economy, and social structure will advance in unison toward digital transformation is quite helpful. The federal initiative "Digital Economy of the Federation" will undoubtedly provide extra push for digital growth [2]**.** Business operations are being transformed by the use of Big Data as well as the introduction of new technology. Chief Data Officer (CDO) is a new role, but it's also about the ongoing training of all the workforce, from entry-level workers to top management. The rules of the game have also altered as a result of new realities, and businesses have adjusted to this transformation. For example, while working on a project in the field of data science may not necessarily have economic rewards, it benefits the team and helps with following jobs. In the age of the digital economy, data is a valuable resource alongside people and money. However, if the HR department is in charge of overseeing both people and money (controlling, risk management, treasury, and other departments), then the data have never before been under anyone's authority. Although they appear to be common, they are actually nobody's. A new role called the CDO is being introduced, and firms are implementing Data Governance procedures. The CDO is currently one of the company's senior executives [3]**.** He is an expert in cutting-edge technology, a corporate strategist, and a supporter of concepts involving the use of data. He is also in charge of different regulatory agencies, data openness, and quality. The CDO creates a plan on how to improve the organization's data analysis capabilities and what staff skills need to be improved. He is also in charge of ensuring that the company has access to the essential tools for effective data extraction, storage, processing, and visualization [4]. The Chief Digital Officer (CDO) may occur in the organization in one of three common places: a department under direct subordination to the CDO, under the Chief Information Officer, or within another business department, like the financial one. The placement of this department relies on a variety of factors, including who came up with the idea first, how well relationships with businesses have developed, and who was most receptive to it at the time of introduction. The practice of introducing the CDO position originated in the West, as the majority of businesses having this position are based in Western Europe or the United States [5]. These are typically big businesses that have a lot of data at their disposal and wish to manage it more effectively, as well as financial institutions that are subject to strict standards and laws, especially in the wake of the 2008 global financial crisis. Some organizations adopt some of these norms and rules, particularly those that are wholly owned subsidiaries of foreign corporations or those whose stock is listed on significant international exchanges. The CDO job has not yet been widely adopted as a result of this, albeit [6].

There is a current lack of skilled workers for organizations since few educational institutions train data analysts and because talented people frequently move to the top companies in the international information technology sector. Every digital talent faces a battle. It used to be difficult to develop computational issues autonomously since massive mainframes, which were only available at corporations, were required to solve computational problems. Today's technologies are more affordable, processing power is increasing, and

everyone needs an everyday laptop to research a topic. Open Source is becoming more popular; analysis packages can be downloaded for free and legally [7]. Additionally, there are educational initiatives from commercial and nonprofit organizations. Anyone who is motivated and has some free time can quickly acquire the skills necessary to apply for entry-level roles in practically any organization. Simply approving the CDO post, the Data Governance policy, or the hiring of excellent data scientists is not sufficient. The company's culture needs to alter for data science initiatives to be successful [8]. Prior to the widespread adoption of Data Science, business cultures were typically built on taking a cautious attitude to risks, cutting expenses, and enhancing operational stability. Prior until now, businesses tended to stick to tried-and-true technologies and business models, and they frequently outsourced their core competences to save money. This happened as a result of the formation of the markets [9].

Such a significant transition cannot be accomplished by sending lone employees to retraining programs. It necessitates a more detailed and fundamental approach. The Chief Officer of Human Resources (COHR), who is in charge of all areas of the high-tech organization's HR management and labor relations policies, procedures, and operations, must take a more active role in it and provide more support. He will assist the company in developing a balanced, end-to-end development program that addresses all of these difficulties by utilizing all of the talents and competencies that HR possesses. The formation of a "umbrella" personnel development program geared toward big data is one example of how to address this program: [10].

- top management receives annual overview training in which executives are educated on the capabilities of data science and successful cases from around the world;
- introductory training for middle management that demonstrates the advantages of applying Data Science and Machine Learning techniques to various jobs;
- a hackathon where mixed teams of managers and data scientists may practice their interactivity;
- Annual advanced case machine training for data scientists;
- regular online competitions for data maintainers on external data sets;
- and individualized training for managers and data scientists.

Cross-industry process for data mining (CRISP-DM), one of the most popular ways to data analysis, presents each task as a specific hypothesis that can be accepted or rejected. Additionally, the hypothesis-building process goes through the normal phases of evaluating the necessary data set, deciding on success criteria and quality metrics, preparing the data for modeling, and evaluating the results. Most frequently, the process is cyclical; some steps might be repeated multiple times [11]. If it turns out that the developed model enhances the company's current procedure or output, it is implemented. However, it might also happen that the efforts put forth do not bear fruit, for instance when there are restrictions on the model's applicability or low data quality. Since the project team has earned experience and information that it will apply to future work on other hypotheses, such circumstances shouldn't be seen as negative outcomes [12]. CRISP-DM is a widely used procedure for data analysis. Six phases make up the data analysis lifecycle model. They are not necessarily in any particular order. In most projects, going back to earlier phases and then moving forward again is the norm. Phases of the data research life cycle include the following (Figure 1.) [13].

3. METHOD

A data science project is comparable to a software development project in that both have the objective of generating revenue or adding value for customers. The code is written to accomplish it. Because of this, managers frequently anticipate simple outcomes from Data Science methods similar to those in software development, and success is solely determined by whether the intended aim has been attained.

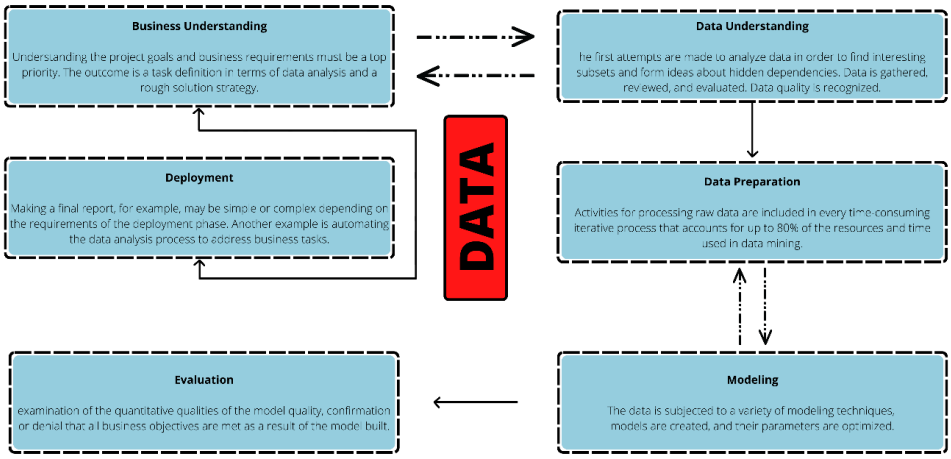

Figure 1. Phases of the CRISP-DM data cycle used for this research

1. Business comprehension. Goals for the phase:
   - to establish corporate objectives;
   - to assess the situation;
   - to choose the goals for data analysis;
   - and to create a project strategy.

2. Data comprehension. Phase goals:
   - include gathering initial data;
   - describing data;
   - researching data;
   - and evaluating data quality;

3. Preparation of data. The following phase objectives can be carried out repeatedly without following a set sequence:
   - data selection (tables, records, and attributes);
   - researching data;
   - data clearing (including conversion and modelling preparation);
   - and data customization.

4. Modeling. Phase goals include :
   - choosing a modelling approach;
   - testing the model, building the model;
   - and evaluating the model.

5. Evaluation. Objectives for this phase include:
   - reviewing the process;
   - evaluating the results;
   - and figuring out what comes next.

6. Deployment. Phase objectives:
   - plan the deployment;
   - support;
   - and monitoring of the deployed solution.

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- to create the final report;
- to create the process review.

A new demand, not typical for the traditional strategy, where a project that has not accomplished the business goal is a failure in advance, is ready to enter the game, the conclusion of which is unknown beforehand. The benefits are clear: a culture of acceptance of unsuccessful outcomes frees workers and fosters productivity, which eventually nevertheless yields successful outcomes [14]. A successful model in banking can be demonstrated by forecasting indirect indicators and historical client income data. The bank can offer an individual loan product based on the data it has collected without obtaining official proof of the borrower's income.

4. DISCUSSION

One can find certain errors in the definition of the phrase "digital economy" or even misinterpretations of the key points that should be properly emphasized in the expanding storm of events devoted to such a significant subject. The three fundamental elements of economic digitalization are sometimes ignored in the fervor of debate and the exchange of knowledgeable perspectives, but each of these elements can be found in the very concept of the digital economy [15]. First, the first word in the phrase "digital economy" refers to data. Whether we like to accept it or not, the next generation of economic systems is based on a gathering and analysis of increasingly more extensive and qualitative data. This is currently becoming objectively achievable and will subsequently grow over time in accordance with the demands of the economic actors to promote their own solutions everywhere and in everything. Digital data sets are everywhere around business, its customers, the general public, and state regulators—not just out of idle curiosity, but also because it is practical and professional. We cannot ignore the significance of gradually progressing towards entire and widespread use of data-driven decision-making, even though we cannot completely rule out transitory misconceptions about the function of data or even making many mistakes in handling it. With organized digital information technologies, every qualified professional's performance can now be multiplied several times over [16]. The data enables the digitization of the business environment around us and the development of high-level models for detailed retrospective business analysis or for predictive "fast" analytics, when decision-making time is constrained to milliseconds. Data helps practitioners validate or refute the theorists' assumptions by revealing new aspects of events and phenomena. In contrast, it is economies' need to construct the infrastructure necessary for their full utilization that drives them to shoulder heavy financial burdens. The technical components of the overall globalization of digital data include data centers, fast communication networks, sensors, and dispersed computing power. Another major area of development in the methods for gathering and processing "figures" is represented by subject applications, intricate algorithms, teachable neural networks, cryptographic protection, maintaining the integrity of data units, productive cloud servers, interactive infographics, and indicator panels [17]. The capabilities of transporting data between IT-Systems and among various subjects have taken on a specific significance in the vast array of technologies for working with data. The methods of data transfer through secure and open systems are actively expanding and changing. Of course, publicly available data from states and communities as well as freely available commercial data are becoming more and more crucial. Because of the data, businesses are forced to reevaluate their actions and acquire the necessary instruments to control them and put them to use for their own practical ends. As a result, a large number more creative initiatives and work groups that generate data gradually and carefully digest it and come up with new ways to get more out of arrays that seem to be stretched and unable to handle it. These digital streams are information-based and can be merged and ground indefinitely. A corporation may not have yet experienced a time when its management had a lot of resources at its disposal. Resources were hard to find since students had grown accustomed to saving them. For the first time, they are currently dealing with an excess rather than a deficit. One can refer to the indefinitely enormous discovered reserves of digital data by analogy with the language used for natural resources. Undoubtedly, the economy will undergo a considerable

transition as a result of this situation. Fundamentally different tools and strategies are required. However, it is important to comprehend what this is truly for in order to effectively extract data and deal with them in a qualitative fashion. Second, in this situation, needs constitute "economy". Consumer behavior is changed by active informationalization. With varying degrees of information quality at their disposal, they develop sophistication and demands. It can be challenging for marketers to delve into the nuances and complexities of social communication in order to truly understand their customers' thoughts and feelings. Is it conceivable to personalize goods and services today and in the future while still operating at a reliable scale of production?. Genuine interest in a specific method of manufacturing things is sparked by a deeper understanding of the demands and preferences of each individual consumer. The first personalized "smart" plant trials were successful because it just relies on robots and obeys commands. Marketing has changed as a result of the fact that it is slowly and progressively approaching the essence of economic contact, the primary motivator causing each person to engage in economic interaction, to the necessities [18]. Sales and intrusive advertising give place gradually to shared consumption and algorithmized technologies. Allow for mistakes and blatant failures along the road. But as the skill is developed, the consumer is examined, the theories are put to the test, and the driving force of needs gives rise to automated production, incredibly quick and versatile robots, new materials and products, and previously unimaginable combinations of practical and approachable services. The power of needs affects how we consume, liberating us from the burden of property and providing us with the comfort and convenience of sharing in exchange. Additionally, digitization offers some incredibly intriguing opportunities for combining the fulfilment of wants that at first glance appear to be at odds with one another. The interaction of logical and intelligent physical objects also enables this. Man employs a machine and algorithmic network that can rapidly and completely meet his wants. Consumption is more powerful. On the basis of the widespread demand and the resources made available, innovative ideas to create new products "by subscription" are starting to take shape in the marketplaces. As a result, they significantly alter how value, pricing, and asset worth are perceived and understood. Cryptocurrencies are a prime example of how free forms of physical and digital resources permeate our lives. The digital economy has a huge possibility to engage with and connect with other global realms including society, cultural values and traditions, history and religion, art and the environment, etc. at the point of intelligent consumption. Only now does it appear that we have the ability to elevate primitive consumption into a tolerable level of complete comfort for everyone, without going against conventional and humanitarian principles. The economy is changing, and the tools used to market or exaggerate the effects of purchased items on consumers will become less effective. Services and goods become open ones. You can regulate a product or service's origin and verify its validity, authorship, quality, and other crucial factors thanks to digital trust. The approach to the supply and sale of a variety of goods and services will undoubtedly undergo major modifications as more types of control devices are mobilized inside a single global information network. There are many different options available, some of them are free or practically so. Additionally, the rapidity with which information about a good or service, its maker, or its seller is disseminated nullifies any attempts to conceal crucial customer traits. However, cutting-edge goods and services, particularly those connected in a web of interconnected physical and logical elements, are increasingly complicated and fundamentally different from conventional goods and services in how they are used by consumers. To address both new and old needs, those who offer essentially novel "digital" solutions only need to develop and perfect novel client-communication strategies and operate in the markets. Visualizing demands and products, demonstrating successful consumer experiences, explaining and educating customers, and offering ongoing, convenient support are all required. However, this uses a significantly different model, technologies, and business models that would be very impossible to run without digital platforms and a deeper comprehension of consuming principles. In order to foresee, plan, organize, execute, monitor, and coordinate all large-scale activities and actively use data to fulfill the expanding demands of humanity, management is a qualified system of interaction and cooperation. And probably more than ever, this system need all-encompassing assistance, including that which is

methodological, technological, informational, instrumental, creative, etc. The quick emergence and expansion of new knowledge as well as new forms of rapid learning are prompted by management's intensive progress toward the informatization of all of its controlled processes and objects. Additionally, online e-learning facilities and game-based methods of acquiring new abilities are becoming increasingly significant. Professionals are now required to pay constant attention to and closely follow events in the target subject area due to the complexity of knowledge, growth in their specialization, constant enrichment with practice, and even contradiction of various approaches and scientific schools. Professionals are also seasoned with high speed experience from successful and unsuccessful startup projects. It becomes crucial and challenging to present a thorough image of one's qualifications in each individual professional field. Additionally, the professional domains started to actively merge, adapt, share, and contract. As a result, it's important to actively study and take part in events involving experts, advice, and conversation. The demand for specialized support resources and competency upkeep will increase gradually [19]. Experts and specialists are attempting to organize their work on the digital transformation of the economy today. It is difficult, though, given the circumstances. To model the digital future at a time when even the majority of technologies hailed as promising are not yet fully functional is quite challenging. Most of the anticipated digital events have very low implementation probabilities, making it challenging to predict the economic benefits they will have. And yet, we must advance, digitizing the world gradually and gradually from individual initiatives and businesses to sectoral and interstate solutions, making blunders and producing ground-breaking original spectacular discoveries [20].

5. RESULT

It makes sense that large and medium-sized businesses in the retail and service sectors are becoming more interested in employing Big Data technologies. Banks and mobile providers are actively utilizing these technology. Large manufacturing firms also utilize them to evaluate information on equipment failures and minimize downtime, which lowers costs. Analysis of data sets, for instance, can improve equipment reliability and lower the number of failures in the field of flight management. Big Data's range of applications, however, is far greater. Purchasing a firm might be one more application for big data technology. The question is how to cover as many different aspects of a corporation as is practical. Additionally, it is the study of arranged data pertaining to :

- physical characteristics;
- operational information;
- financial information;
- material resources;
- and legal information.

File tables, conventional database management systems, and accounting systems are possible information sources. Analyzing chaotic data from events, service requests, inspection results, customer comments, the competitive landscape, and IT infrastructure is also important. In this case, information sources may include charts, diagrams, social media, professional opinions, etc. The so-called object passport, which comprises information on location, area, number of floors, permits, inventory data, competitive environment, historical financial data, seasonal elemen of sales, etc., might be the end result of the analysis of such data. However, as is well recognized, the company's value is not the same as the straightforward total of its tangible assets. Estimating the value of intangible assets will be achievable thanks to the collection and analysis of data using big data technology. They could contain :

- talents, expertise, and resources;
- databases and information sources;
- management and organizational structure;
- skills, future employees;
- brand recognition and client bases;

- innovations;
- and counterparty relationships.

Medium-sized and large businesses in some countries are already expected to have a CDO. He typically makes direct reports to the upper management. Even in our larger firms, this role is still uncommon. Specialists in Big Data management and related analytics are in limited supply. In theory, universities in Russia don't really train these specialists. Young IT professionals have recognized the need for such professionals. Since the conversion of the economic system to a digital one is essentially related to the appropriate administration of large data, these issues are particularly pertinent in light of the State Program "Digital Economy" authorized by the Government of the Russian Federation in 2017 [21].

6. CONCLUSIONS

A topic that is currently important both at the level of particular organizations and at the state level is the management of structured and unstructured data with the aid of new technologies and instruments for its processing. The possibilities of analytics are substantially increased and it is now feasible to gather important information for customers thanks to the analysis of Big Data (methods of processing massive amounts of data for specific activities and objectives). Businesses can learn a great deal of important information about rivals, partners, and clients by utilizing the potential of big data. Big Data technologies are no longer a national treasure in the age of multinational corporations and worldwide collaboration. Big Data's function is to be a liquid product, a requirement for enhancing enterprises' profitability through individualized customer service and predictive analytics. It is essential to achieve the establishment of data exchanges as well as the legalization of a single definition of big data for the Russian digital economy. This will be a key component of the Russian economy's ability to compete on the global market and a huge step in promoting domestic enterprise within the nation.

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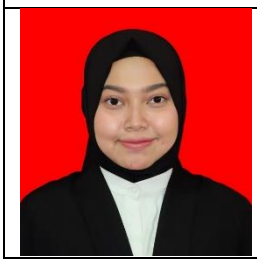	**Alfiah Khoirunisa,** University of Raharja, Tangerang, Indonesia, alfiah@raharja.info