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LEVERAGING BIG DATA FOR DIGITAL ECONOMIC GROWTH: A COMPREHENSIVE ANALYSIS

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Abstract: This study examines the transformative impact of big data on the digital economy, focusing on its role in driving economic growth through innovation and data-driven decision-making. Is analyzing the applications of big data in sectors such as finance, telecommunications, and retail and discusses the challenges associated with data management and infrastructure. As a result of addressing these challenges, companies can utilize big data to improve efficiency, predict market trends, and maintain competitiveness. The results of the study highlight, that while developed countries are leading the way in the adoption of big data, countries such as Armenia have begun to recognize its strategic value, although they face infrastructural and regulatory challenges.

Keywords: Big Data, digital economy, data analytics, economic growth, innovation, technology, market trends

JEL codes: O33, O31, C80

Research aims: to analyze big data's role in driving economic growth, explore its application across industries,

identify challenges and strategies for optimizing data use to support informed decision-making and sustainable growth.

Research novelty: using strategic analysis of big data's transformative role across economic sectors, emphasizing its application in developing economies like Armenia and its implications for sustainable growth.

Introduction

Big data is reshaping the digital economy, challenging traditional economic models and driving growth. Defined as large, complex datasets that require advanced processing techniques (McKinsey & Company, 2011), big data offers organizations the ability to gain insights that drive innovation and efficiency. Laney's (2001) "three V's" framework -Volume, Velocity, and Variety -captures the scale, speed, and diversity that define big data. Data's strategic value is often compared to oil, underscoring its role in enhancing competitiveness and supporting growth through refined strategies, cost reduction, and improved customer experiences (Mayer-Schönberger & Cukier, 2013).

Advances in artificial intelligence (AI), machine learning (ML), and quantum computing are transforming big data analytics. AI and ML, in particular, have enabled organizations to analyze unstructured data, identify patterns, and predict trends, making analytics more accessible and impactful. These tools are enabling traditional industries to make data-driven decisions and streamline operations.

In Armenia, the finance and banking sectors are pioneering the use of AI and ML for credit scoring and risk assessment. However, limitations in high-performance computing resources and a shortage of skilled AI professionals hinder wider adoption. Addressing these challenges through targeted training programs and partnerships with technology firms could accelerate Armenia's progress in leveraging big data and advanced analytics across diverse industries.

Research results

The global landscape of business has undergone a transformative shift, with the ascendance of IT companies at the forefront of market capitalization. This trend underscores a fundamental change in the way value is generated and perceived in the modern economy. At the heart of this shift is data - vast volumes of it - that these organizations not only generate and own but also utilize as the primary catalyst for business growth and innovation.

The leading tech companies currently using big data applications include Apple, Microsoft, Nvidia, Alphabet, Amazon, Meta, and TSMC. Each of these companies integrates big data into core business operations, impacting their market value and industry influence.

As of September 2024, Apple, valued at $3.387 trillion, has leveraged big data to improve user experience on its devices and services, such as personalized recommendations and health analytics. Microsoft, at US $3.043 trillion, provides Azure’s big

data solutions, such as Azure Synapse Analytics and Data Lake, supporting large-scale data storage and analysis needs. Nvidia, valued at US $2.649 trillion, supplies GPUs critical for AI-driven big data tasks, enabling complex data processing in various industries. Alphabet, at US $1.944 trillion, empowers companies through Google Cloud's big data services, including BigQuery[1], facilitating massive data analytics and real-time processing. Amazon, valued at US $1.849 trillion, applies big data in its e-commerce analytics and provides AWS services like Redshift and Kinesis, which are widely used for data streaming and analytics. Meta Platforms, with a market cap of US $1.294 trillion, rely heavily on big data to refine user engagement on social media and optimize targeted advertising. Finally, TSMC, with a valuation of US $832.31 billion, is vital for data center hardware, as its semiconductors support the infrastructure necessary for big data operations (Ventura, 2024).

Each of these tech companies has a significant role in driving digital innovation and transformation, impacting both the technology sector and the broader global economy. These companies integrate big data technologies into their products and services, a strategy that fosters innovation and creates steady revenue streams. They represent a shift in the tech sector towards data-driven growth and recurring revenue models, which offer greater stability and resilience against market fluctuations. Their focus on big data has also differentiated them

1 BigQuery is a fully managed, AI-ready data analytics platform that helps you maximize value from your data and is designed to be multi-engine, multi-format, and multi-cloud.

from traditional sectors, highlighting the growing value of data analytics in maintaining market leadership.

According to projections, the total transaction value in the Digital Investment market is set to reach a staggering US $2,791.00bn by 2024. This growth is further expected to continue at an annual growth rate of 6.19% from 2024 to 2027, resulting in a projected total transaction value of US $3,342.00bn by 2027. This indicates the growing popularity and adoption of automated investment platforms (Statista, 2023).

The implementation of data-driven methodologies empowers marketers to enhance their campaigns, attain a competitive edge, and augment client pleasure. The continuous development of the digital landscape will inevitably establish Big Data analytics as a fundamental component of successful marketing strategies, exerting a significant influence on the future trajectory of the sector (Islam, 2024).

It is important to note, that the technologies required for managing and developing intellectual property differ significantly from traditional technologies and are of higher value. IT professionals also possess a unique level of education and expertise, warranting higher salaries compared to traditional data analysts.

Despite the increasing importance of IT utilization by organizations in the Republic of Armenia, many businesses struggle to implement systems due to limited financial and human resources. However, Armenian businesses are starting to integrate data analytics into their marketing efforts, particularly in industries like retail, banking, and telecommunications. For

instance, Armenian banks analyze customer transaction data to tailor financial products and services to different client segments. Telecom providers track usage patterns to create targeted offers and service plans. However, broader adoption is hindered by infrastructure limitations and a lack of specialized expertise. Addressing these challenges could unlock new growth opportunities for Armenia, enabling it to capitalize on big data's economic potential.

In the context of large-scale data collection and processing, it is also essential to analyze market trends, such as customer or transaction numbers and their potential evolution.

The banking and financial services industry generates and processes vast amounts of data. Utilizing big data within the banking sector can improve the organization and monitoring of credit, fraud, operational, and integrated risk assessment management systems.

To illustrate the dynamics of data collection and the potential of large-scale data in the Republic of Armenia's banking system, consider the bank client base, payment cards, and transaction data. According to the Union of Banks of Armenia, the number of payment cards in 2023, the number of bank clients increased by 2,696 thousand compared to 2013, and by 16.3% compared to the previous year. In the same period, customer accounts increased by 6,116 thousand compared to 2013, and by 18.6% compared to the previous year. In 2023, the number of payment cards was 3,722 thousand, which increased by 2,159 thousand compared to 2013, and by 16.9% compared to the previous year. In 2023, 393,117 thousand payments were made with payment

cards. Per transaction, which increased by 372,576 thousand compared to 2013. and by 97.6% compared to last year (Union of Banks of Armenia, 2024).

In this context, if we examine the telecommunications sector, the telecommunications sector is indeed at the forefront of utilizing big data, especially given the vast user data it generates, which is crucial for driving decisions around customer experience, operational efficiency, and fraud prevention.

The financial impact of big data in the telecommunications sector is significant. Studies indicate, that big data contributes approximately 2.9% to a telecom company's total profit margin, highlighting the substantial return on investment for data-driven strategies.

In Armenia, this is reflected in the growing adoption of data analytics by leading telecom providers like Viva, Team Telecom, and Ucom, though they face unique challenges in scaling these initiatives due to infrastructure and regulatory constraints.

The analysis of Armenia's telecom subscriber base from 2013 to 2023 provides a clear picture of the sector's growth dynamics and potential. The dynamics of mobile subscribers in Armenia from 2013 to 2023 indicate an average annual growth rate of 1.7 percent. According to 2023 data, the level of mobile telephony penetration in Armenia is quite high, with 132 active mobile phone cards per 100 people. An analysis of the growth in mobile broadband wireless internet subscribers in Armenia from 2013 to 2023 shows an average annual growth rate of 13.9 percent. The number of mobile broadband wireless internet

subscribers currently stands at 16 per 100 inhabitants (Public Services Regulatory Commission of the Republic of Armenia, 2024).

For Armenian telecoms, scaling up big data capabilities could unlock new efficiencies and competitive advantages. For instance:

1. Personalized Customer Offerings: By deepening data analytics, telecom companies could further tailor services and promotions, enhancing customer satisfaction and loyalty.

2. Network Optimization: Using data-driven insights for proactive network management could reduce service disruptions, especially as internet access continues to grow.

3. Fraud Detection: Expanding fraud detection capabilities with advanced analytics could help mitigate financial losses and strengthen consumer trust in a highly competitive environment.

In Armenia, the perception of data as a valuable resource is evolving, reflecting a growing understanding that data has the potential to actively contribute to economic value. In the financial sector, the data collected by banks is often transferred to other institutions as required by law, yet without direct revenue generation. For instance, banks are required to provide data to credit bureaus for free under regulations set by the Central Bank of Armenia and various laws governing banking activities. However, banks incur costs when querying these credit bureaus and databases, as they still incur costs when accessing these credit databases for their operational needs.

Recent research on new business solutions by telecommunications operators indicates, that they tend to develop commercial products tailored to a generalized customer base using big data insights.

As the use of big data expands, the need for robust regulatory frameworks to protect individual privacy and uphold ethical standards becomes increasingly pressing. The European Union's GDPR has set an influential benchmark in this area, promoting transparency and giving consumers greater control over their personal information. While Armenia has made notable strides in advancing its data protection regulations, further refinement is necessary to address specific challenges posed by big data, including issues related to data ownership, data-sharing protocols, and penalties for data breaches.

Finally, for Armenian businesses, adopting ethical data practices and establishing transparent policies is essential to building and maintaining public trust. As data becomes a more significant asset, companies face complex ethical considerations around how they collect, store, and use information. Implementing clear, transparent policies and strong security measures will be vital for fostering a trustworthy data environment, enabling both businesses and consumers to fully realize the advantages offered by big data.

Conclusion

The following are the main conclusions and recommendations on the leveraging of big data to accelerate economic growth and innovation in Armenia:

- ✓ Big data plays an essential role in driving digital economic growth, business model transformation, and efficiency improvements across sectors.
- ✓ AI-driven analytics has significantly expanded the potential of big data, but challenges remain, such as high costs and a shortage of skilled professionals in data science, artificial intelligence, and cybersecurity.
- ✓ Armenia's financial and telecommunications industries have started to implement big data solutions, showing early progress.
- ✓ Limited digital infrastructure and a skilled shortage of specialized professionals are barriers to broader adoption of big data strategies in Armenia.
- ✓ The Armenian government's use of big data in public administration, particularly in the tax and customs sectors, demonstrates the potential of data-driven governance.
- ✓ Establishing robust data privacy rules similar to GDPR is necessary to build trust and transparency in the country.
- ✓ Implementing a robust data governance framework will protect consumer privacy and build trust between business, government and the public.
- ✓ Prioritizing investment in digital infrastructure, expanding data science and artificial intelligence training programs, and encouraging public-private partnerships are key strategies for Armenia to fully leverage big data.

- ✓ Creating a data-literate workforce and adopting scalable technologies such as cloud computing will enable Armenia to integrate more effectively into the global digital economy.
- ✓ A more strategic focus on big data will contribute to sustainable economic growth and strengthen Armenia's status as an advanced digital economy.

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ՄԵԾ ՏՎՅԱԼՆԵՐԻ ԿԻՐԱՌՈՒՄԸ ԹՎԱՅԻՆ ՏՆՏԵՍՈՒԹՅԱՆ ԱՃԻ ՆՊԱՏԱԿՈՎ. ՀԱՄԱՊԱՐՓԱԿ ՎԵՐԼՈՒԾՈՒԹՅՈՒՆ

Անի Արշակյան

Հայաստանի պետական տնտեսագիտական համալսարան, ասպիրանտ

Բանալի բառեր - Մեծ տվյալներ, թվային տնտեսություն, տվյալների վերլուծություն, տնտեսական աճ, նորարարու-թյուն, տեխնոլոգիա, շուկայի միտումներ

Համաշխարհային փորձը ցույց է տալիս, որ շուկայական ամենամեծ կապիտալիզացիա ունեցող կազմակերպու-թյունների մեծ մասը SS ոլորտի ընկերություններ են, որոնք ստեղծում և տիրապետում են մեծածավալ տվյալների: Սա նշանակում է, որ տվյալների ստեղծումը, դրանց տիրապե-տումը և օգտագործումը այսօր բազմաթիվ ընկերությունների հիմնական ակտիվն է, իսկ հետագայում վերջիններս կապիտալացնելը անմիջականորեն ազդելու է կազմակեր-պության եկամուտների, դրանց ձևավորման եղանակների ու կառուցվածքի վրա՝ բերելով բիզնեսի արժեքի փոփոխության:

Արհեստական բանականության (AI), մեքենայական ուսուցման (ML) և քվանտային հաշվարկների առաջընթացը փոխակերպում է մեծ տվյալների վերլուծությունը: Հատկապես AI-ը ML-ը կազմակերպություններին հնարավո-րություն են տալիս վերլուծել չմշակված տվյալները, բացահայտել օրինաչափությունները և կանխատեսել միտումները:

Ժամանակի ընթացքում բարձրանում է ՀՀ կազմակեր-պությունների կողմից ՄՏ-ի կիրառման կարևորության աստիճանը և վերջիներիս կողմից տվյալների արժեքի ընկալման փոփոխությունն է, որը պետք է զարգացնի այն թեզը, որ տվյալն ինքնին ակտիվ է ու կարող է դառնալ ակտիվ գեներացնող:

Ուսումնասիրության արդյունքները ցույց են տալիս, որ մինչ զարգացած երկրները առաջատար են մեծ տվյալների ընդունման հարցում, ապա տնտեսապես զարգացող երկրներում, ինչպիսին Հայաստանն է, թերևս նոր են սկսել ճանաչել դրա ռազմավարական արժեքը՝ բախվելով ենթակառուցվածքային և կարգավորիչ մարտահրավերների:

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