The impact of digital environment factors on the innovative performance indicators of Armenian companies

Margaryan Sona A.
Lecturer, Department of Service Business Organization
Armenian State University of Economics (Yerevan, RA)
https://orcid.org/0009-0000-0303-2188
son.margaryan97@gmail.com

UDC: 330.34; 330.341.1; 331.101.3; **EDN:** MXLFLX; **JEL**: O33, L81, F14, D22, C25
DOI: 10.58587/18292437-2026.5-232
Keywords & phrases: digitalization; E-commerce; digital technology adoption; export activity; Internet of things (IoT); Website functionality

Թվային միջավարի գործոնների ազդեցությունը ՀՀ ընկերությունների նորարարական արդյունքային ցուցանիշների վրա

Մարգարյան Սոնա Ա.
Ծառայությունների բիզնեսի կազմակերպման ամբիոնի դասախոս
Հայաստանի պետական տնտեսագիտական համալսարան (Երևան, ՀՀ)

Ամփոփագիր. Սույն հոդվածի նպատակը Հայաստանի Հանրապետության ընկերություններում տեղեկատվական տեխնոլոգիաների օգտագործման և էլեկտրոնային առևտրի արդյունավետության գործընթացների ուսումնասիրությունն է: ՀՀ ՎԿ կողմից 2023 թ.-ին իրականացված շուրջ 1974 ձեռնարկությունների շրջանում կատարված հարցումների միջոցով ձևավորված միկրոտվյալների հիման վրա իրականացվել է լոգիստիկ ռեգրեսիոն մոդելով գնահատում, որով բացահայտվել են ընկերությունների էլեկտրոնային առևտրի և արտահանման վրա ազդող թվայնացման առավել նշանակալի գործոնները: Համաձայն հետազոտության արդյունքների՝ սոցիալական ցանցերի քանակի և վեբ կայքի ֆունկցիոնալության մեկ միավորով աճը հանգեցնում է էլեկտրոնային առևտուր իրականացնելու հավանականության աճի՝ համապատասխանաբար 9.04 և 7.43 տոկոսով, նմանապես՝ կազմակերպության արտահանող հանդիսանալու հավանականության աճի՝ համապատասխանաբար 2.56 և 3.11 տոկոսով: Ըստ մոդելի արդյունքների՝ իրերի համացանցի (IoT) կիրառությունը բարձրացնում է ընկերությունների կողմից էլեկտրոնային առևտուր իրականացնելու հավանականությունը 7.03 տոկոսով: Միևնույն ժամանակ, թվային տեխնոլոգիաների յուրացման, ներդրման և կիրառման հանգամանքը հանգեցնում է կազմակերպության արտահանող հանդիսանալու հավանականության աճի 5.5 տոկոսով, բարձր արագությամբ ինտերնետի մեկ միավորով աճը հանգեցնում է կազմակերպության արտահանող հանդիսանալու հավանականության աճի 7.55 տոկոսով:
Հանգուցաբառեր և բառակապակցություններ՝ թվայնացում, էլեկտրոնային առևտուր, թվային տեխնոլոգիաների ներդրում, արտահանման գործունեություն, Իրերի համացանց (IoT), սոցիալական մեդիա, վեբկայքի ֆունկցիոնալություն

Влияние факторов цифровой среды на показатели инновационной деятельности армянских компаний

Маргарян Сона А.
Преподаватель кафедры организации сервисного бизнеса
Армянский государственный экономический университет (Ереван, РА)

Аннотация. Целью данной статьи является изучение процессов использования информационных технологий и эффективности электронной коммерции в компаниях Республики Армения. На основе микроданных, полученных в ходе опросов, проведенных Статистическим комитетом Республики Армения среди 1974 предприятий в 2023 году, была проведена оценка с использованием модели логистической регрессии, которая выявила наиболее значимые факторы цифровизации, влияющие на электронную коммерцию и экспорт компаний. По результатам исследования, увеличение на один пункт количества социальных сетей и функциональности веб-сайта приводит к увеличению вероятности ведения электронной коммерции на 9,04 и 7,43 процента соответственно, и к увеличению вероятности того, что организация станет экспортером, на 2,56 и 3,11 процента соответственно. По результатам модели, использование Интернета вещей (IoT) увеличивает вероятность ведения электронной коммерции компаниями на 7,03 процента. В то же время, внедрение и использование цифровых технологий приводит к увеличению вероятности того, что организация станет экспортером, на 5,5 процента, а увеличение скорости интернета на один процентный пункт приводит к увеличению вероятности того, что организация станет экспортером, на 7,55 процента.

Ключевые слова и словосочетания: цифровизация, электронная коммерция, внедрение цифровых технологий, экспортная деятельность, интернет вещей (IoT), социальные сети, функциональность веб-сайта

Introduction

Amidst rapid technological changes, the impact of digitalization is crucial for ensuring the competitiveness of entire national economies, as well as that of individual economic sectors and companies. The adoption of digital technologies within companies is a fundamental driver of development in modern economies. Digitalization and the intensive use of network technologies have enabled companies to significantly enhance their adaptability and the speed at which they effectively respond to changes in demand. Through digital tools and technologies, companies are able to substantially expand the spatiotemporal boundaries of their business operations.

Researchers have made interesting observations regarding the place or functional role of modern digitalization within the interplay between innovation and entrepreneurship. Specifically, based on data from 22,508 enterprises worldwide, Samsami et al. (2025) examined whether digitalization mediates, moderates, or independently contributes to the link between entrepreneurial orientation and innovation; they concluded that digitalization primarily acts as a moderator and a complementary capability, rather than as a mediating factor [**1**]. Based on a case study of Indonesian small and medium-sized enterprises (SMEs), Hermawati et al. (2024) conclude that innovation and entrepreneurship in this sector mutually reinforce and complement each other within the context of digital technology adoption [**2**]. Romero and Mammadov (2024), examining the digital transformation process of small and medium-sized enterprises within the context of innovation, conclude that it encompasses three interconnected levels: (1) the technological dimension, (2) the human capital dimension, and (3) the organizational/relational dimension. By integrating these dimensions, the authors conclude that the multifaceted use of the Internet by companies fosters digital product innovation, while their drive for growth stimulates digital process innovation [**3**].

Taking into account the aforementioned issues regarding digitalization and digital transformation, this article aims to examine the impact of the digitalization of Armenia's economy on corporate performance indicators, as well as to clarify the role of information and communication technologies within the innovative entrepreneurship ecosystem.

Literature Review

A significant number of theorists and researchers consider digitalization and the implementation of network technologies to be key drivers of changes in corporate behavior. Wirtz et al. (2022) argue that digitalization triggers fundamental changes in the corporate business ecosystem, leading to the obsolescence of existing business models [**4**]. According to Hess et al. (2016), when faced with such challenges, organizations develop strategic responses and employ digital technologies to transform the value-creation approaches they previously relied on primarily to maintain competitiveness **[5**]. For their part, Chan et al. (2022) maintain that social networks enhance a company's market visibility and facilitate connections with other market participants, enabling seamless access to and exchange of information—anytime and anywhere—as well as the monitoring of work processes and remote collaboration [**6**]. Teubner and Stockhinger (2020) hold the view that digitalization is the interaction between digital technologies and the social and institutional processes that transform these technologies into infrastructural technologies, thereby fostering communication, mobility, speed, virtualization, the removal of boundaries, interconnectedness, market transparency, and competition [**7**].

In the context of the issue under consideration, a significant number of researchers focus on aspects of the combination of entrepreneurship and digitalization—specifically, the circumstances of uncertainty and risk. In this sense, entrepreneurship and digitalization form a new, more viable combination by significantly reducing the level of uncertainty. These new realities give rise to the phenomenon of digital entrepreneurship, which entails more open and collaborative spatiotemporal boundaries among market actors. From this perspective, many theorists (e.g., Aldrich, 2014) emphasize the emergence of new collective or group-based forms of entrepreneurship driven by digitalization [**8**].

In economic literature, modern systems of innovative entrepreneurship are also discussed within the context of their close connection and interdependence with digital infrastructures and digital platforms. In this sense, digital infrastructures are defined as technological systems that create new opportunities for collaboration, communication, or computing aimed at supporting innovation and entrepreneurship. For instance, Hatch (2013) argues that modern cloud computing, digital creative spaces, and data analytics have enabled new ventures to cost-effectively build and test cutting-edge innovative concepts while engaging a broader range of potential customers [**9**]. For his part, Davidson (2015) argues that, based on the scope of entrepreneurial opportunities, digital

platforms serve as part of the new venture idea (or outcome), whereas digital infrastructures act as an external enabler, supporting that process [**10**].

Given the growing impact of digitalization on entrepreneurship, many researchers and experts strive to describe emerging combinations of content using the most accurate and relevant categories and terms. In this context, the term "digital artifact" is frequently encountered in economic literature. Early interpretations of this concept are associated with the research of Youngjin Yoo and his co-authors (2010). Specifically, Yoo notes that the unprecedented power and pervasive presence of digital technologies have created new opportunities for members of society—not only to enjoy the possibilities offered by digital technologies in their daily lives (Yoo, 2010) but also to create innovative products [**11**]. Yoo and a number of other co-authors also argue that digitalization significantly enhances and expands the opportunities for small and medium-sized enterprises. Yoo and his colleagues (2010) linked this perspective to the emergence of a new technical architecture—"Layered Modular Architecture" (LMA)—which created conditions where the locus of value creation shifted from the controlled environments of large corporations to ordinary yet tech-savvy individuals and entrepreneurs **[12]**.

Methodology

To analyze the links between digitalization, e-commerce, and exports among organizations in the Republic of Armenia, this study employed a modified version of the logistic regression model (Logit model) developed by Tramer and Elliott (2008) [**13**]. This approach enabled an assessment of the impact of digitalization trends on organizations' engagement in e-commerce and export activities, utilizing a database compiled from a 2023 survey of approximately 1,974 enterprises conducted by the Statistical Committee of the Republic of Armenia [**14**]. To this end, two logistic models were estimated using the specifications described below, and the marginal effects of the respective indicators were calculated based on the resulting coefficients:

$$(1)\quad Y_i^* = \beta_0 + \sum_{j=1}^{k} \beta_j X_{ji} + \varepsilon_i$$

$$(2)\quad f(x) = \begin{cases} 1, & Y_i^* > 0 \\ 0, & otherwise \end{cases}$$

$$(3)\quad \ln\left(\frac{P_i}{1-P_i}\right) = \beta_0 + \sum_{j=1}^{k} \beta_j X_{ji}$$

$$(4)\quad P(Y_i = 1|X_i) = \frac{exp\ (\beta_0 + \sum_{j=1}^{k} \beta_j X_{ji})}{1 + exp\ (\beta_0 + \sum_{j=1}^{k} \beta_j X_{ji})}$$

In the first model, the dependent variable considered was a binary indicator representing whether the organization conducts e-commerce via its own website, a third-party website, or Electronic Data Interchange (EDI); specifically, the indicator took the value of 1 if the organization engages in e-commerce and 0 otherwise. The explanatory variables considered were the number of social networks used by the organization (0–5) and the number of functions available on the website—a comprehensive indicator of functionality—where the value ranged from 0 to 5 depending on whether the organization's website allows users to:

- the description of the product or service, or information regarding products, services, or prices,
- online ordering, booking, or pre-ordering functions (e.g., the shopping cart),
- the ability for visitors to customize or design products or services online,
- personalized content on the website for regular or returning visitors,
- links to or mentions of the enterprise's social media pages.

A binary variable indicating the organization's adoption of the **Internet of Things (IoT)** was also included in the model as an independent variable; it took the value of 1 if the organization utilized this technology—which may involve internet-connected sensors that automatically collect and exchange data regarding production, consumption processes, logistics, and other key operational areas—and 0 otherwise.

Analysis and Results

The database serving as the foundation for our research enabled a comprehensive quantitative assessment of the impacts of digital transformation within the business sector of the RA economy and the identification of their most significant aspects. Specifically, one of the developed models focuses on the probabilistic assessment of how the use of social networks and website functionality by companies affects e-commerce volumes. The results are presented in the table below.

Based on the modeling results, the following conclusions can be drawn:

- A one-unit increase in the number of social media channels and in website functionality leads to an increase in the probability of engaging in e-commerce by 9.04% and 7.43%, respectively.
- The adoption of the Internet of Things (IoT) increases the probability of engaging in e-commerce by 7.03%.

In parallel, the second model considers the organization's status as an exporter—a binary variable {0,1} — as the dependent variable. Alongside the explanatory variables described in the previous model (number of social networks and website functionality), this model also examines access to high-speed internet (100 Mbps or higher) and a binary variable representing the organization's adoption, implementation, and use of digital technologies; this variable takes the value of 1 if the

organization utilizes at least one of the following: e-commerce, the Internet of Things (IoT), cloud computing technologies, artificial intelligence, or digital data exchange. The estimated results of the model are presented below.

Table 1. *Results of the assessment of the impact of digital factors on the e-commerce of RA companies, 2023.*

Dependent Variable: ECOMMERCE_B1_DV
Method: ML - Binary Logit (Newton-Raphson / Marquardt steps)
Date: 09/13/26 Time: 10:53
Sample: 1 1974
Included observations: 1522
Convergence achieved after 6 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal impact**
SOCIAL_MEDIA_COUNT	0.842718	0.113313	7.437055	0.0000	**0.0904**
WEB_FUNCTION_COUNT	0.692813	0.076682	9.034885	0.0000	**0.0743**
IOT_DV	0.654844	0.184161	3.555824	0.0004	**0.0703**
C	-4.067155	0.216585	-18.77859	0.0000	

McFadden R-squared	0.243507	Mean dependent var	0.122208
S.D. dependent var	0.327633	S.E. of regression	0.289130
Akaike info criterion	0.567029	Sum squared resid	126.8992
Schwarz criterion	0.581031	Log likelihood	-427.5088
Hannan-Quinn criter.	0.572241	Deviance	855.0175
Restr. deviance	1130.239	Restr. log likelihood	-565.1195
LR statistic	275.2214	Avg. log likelihood	-0.280886
Prob(LR statistic)	0.000000		

Obs with Dep=0	1336	Total obs	1522
Obs with Dep=1	186		

Table 2. *Results of the assessment of the impact of digital factors on the exports of RA companies, 2023.*

Dependent Variable: EXPORTER
Method: ML - Binary Logit (Newton-Raphson / Marquardt steps)
Date: 09/13/26 Time: 12:57
Sample: 1 1974
Included observations: 1219
Convergence achieved after 4 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal impact**
DIGITAL_ADOPTION_DV	0.341299	0.156893	2.175355	0.0296	**0.0550**
HIGH_SPEED_100PLUS	0.468808	0.151645	3.091478	0.0020	**0.0755**
WEB_FUNCTION_COUNT	0.192817	0.073951	2.607352	0.0091	**0.0311**
SOCIAL_MEDIA_COUNT	0.158839	0.089105	1.782607	0.0747	**0.0256**
C	-2.033605	0.142633	-14.25759	0.0000	

McFadden R-squared	0.033179	Mean dependent var	0.201805
S.D. dependent var	0.401512	S.E. of regression	0.395135
Akaike info criterion	0.980621	Sum squared resid	189.5440
Schwarz criterion	1.001563	Log likelihood	-592.6883
Hannan-Quinn criter.	0.988503	Deviance	1185.377
Restr. deviance	1226.056	Restr. log likelihood	-613.0280
LR statistic	40.67944	Avg. log likelihood	-0.486209
Prob(LR statistic)	0.000000		

Obs with Dep=0	973	Total obs	1219
Obs with Dep=1	246		

Based on the modeling results, the following conclusions can be drawn:

- The adoption, implementation, and use of digital technologies increase the probability of an organization being an exporter by 5.5%.
- A one-unit increase in the number of social media channels and in website functionality leads to an increase in the probability of an organization being an exporter by 2.56% and 3.11%, respectively.
- A one-unit increase regarding the availability of high-speed internet (at least 100 Mbit/s) leads to a 7.55% increase in the probability of an organization being an exporter.

Conclusions

An analysis of the impact of key directions and factors of economic digital transformation on various sectors of the Armenian economy—and on the business sector as a whole—reveals that these effects align with the major trends and patterns observed in various countries over recent decades. In particular, the development of digital tools and infrastructure has yielded impressive results in the e-commerce and export sectors. However, the impact of various digital ecosystem tools is not always significant; this can be attributed to disparities in digital readiness and the adoption of cutting-edge technologies across different economic sectors, as well as a lack of the necessary human capital skills for the effective application of these technologies.

References

1. **Samsami, M., San-Martín, P., Palazuelos, E. & Schøtt, T.** "Roles of digitalization in the effect of entrepreneurial orientation on innovation in startups: mediator, moderator, capability?" *Information Systems and e-Business Management*, 2025. DOI: 10.1007/s10257-025-00709-2
2. **Hermawati, W., Febrianda, R., Aminullah, E., et al.** "SME owners' roles for mutual reinforcement of innovation and entrepreneurship in dealing with digital technologies." *Asian Journal of Technology Innovation*, 2024/2025. DOI: 10.1080/19761597.2024.2376602
3. **Romero, I. & Mammadov, H.** "Digital Transformation of Small and Medium-Sized Enterprises as an Innovation Process: A Holistic Study of its Determinants." *Journal of the Knowledge Economy*, 2024/2025. DOI: 10.1007/s13132-024-02217-z
4. **Wirtz, B. W., Weyerer, J. C., Heckeroth, J. K.** Digital disruption and digital transformation: A strategic integrative framework. // *International Journal of Innovation Management*, 2022, 26(3):2240008. https://doi.org/10.1142/S1363919622400084
5. **Hess, T., Matt, C., Belina, A., Wiesböck, F.** Options for formulating a digital transformation strategy. // MIS Q Exec 2016, 15(2):123–139. DOI: 10.4324/9780429286797-7
6. **Chan, Y. E., Krishnamurthy, R., Sadreddin, A.** Digitally-enabled university incubation processes. *Technovation* 2022, 118:102560. DOI: 10.1016/j.technovation.2022.102560
7. **Teubner, R. A., Stockhinger, J.** Literature review: understanding information systems strategy in the digital era. J Strat Inform Syst 2020, 29:101642. https://doi.org/10.1016/j.jsis.2020.101642
8. **Aldrich, H. E.** The democratization of entrepreneurship? Hackers, makerspaces, and crowdfunding. *Academy of Management Proceedings*, 2014(1), 10622. https://doi.org/10.5465/ambpp.2014.10622symposium
9. **Hatch, M.** The maker movement manifesto: Rules for innovation in the new world of crafters, hackers, and tinkerers. - New York: McGraw-Hill. 2013, ISBN 978-0-07-182112-4
10. **Davidsson, P.** Entrepreneurial opportunities and the entrepreneurship nexus: A re-conceptualiza tion. Journal of Business Venturing, 2015, 30, 674–695. https://doi.org/10.1016/j.jbusvent.2015.01.002
11. **Yoo, Y.** Computing in everyday life: A call for research on experiential computing. // *MIS Quart.* 2010, 34(2):213–231. https://doi.org/10.2307/20721425
12. **Yoo, Y., Henfridsson, O., Lyytinen, K.** Research commentary — The new organizing logic of digital innovation: An agenda for information systems research. // *Inform. Systems Res.* 2010, 21:724–735. https://doi.org/10.1287/isre.1100.0322
13. **Tranmer, M., & Elliot, M**. Binary logistic regression. Cathie Marsh for census and survey research, 2008, paper, 20. https://hummedia.manchester.ac.uk/institutes/cmist/archive-publications/working-papers/2008/2008-20-binary-logistic-regression.pdf
14. **"Survey on ICT Usage and E-commerce by Business Entities" – 2023.** Statistical Committee of the Republic of Armenia, https://armstat.am/en/?nid=15

Сдана/Հանձնվել է՝ 21.09.2026
Рецензирована/Գրախոսվել է՝ 28.09.2026
Принята/Ընդունվել է՝ 05.10.2026