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## THE RELEVANCE OF TECHNOLOGICAL QUALITY FOR THE SUSTAINABLE BUSINESS OPERATIONS OF ECONOMIC ENTITIES

### Abstract

*The technological level of contemporary economic entities is closely linked to global trends in new technologies. Revolutionary trends in the development of new technologies create modern and efficient economic entities and enable them to operate in the global market through various computerized structural models. An economic entity striving for success pays special attention to technological improvement as an output indicator of sustainable operations, incorporating sustainable development into its business strategy. This paper examines the validation of technological quality and the selected factors relevant to the sustainable operations of economic entities. The core idea is to identify the central value of the achieved technological level of national economic entities as a relevant factor in generating their sustainability in the market. The assumption is that the level of operations and the duration of functioning significantly impact the differences in the technological levels of national economic entities.*

**Keywords:** technological level, sustainable business, economic entities, business level, duration of functioning.

**JEL classification:** L24, M14, O14, O33

## РЕЛАЦИЈЕ ТЕХНОЛОШКОГ КВАЛИТЕТА ЗА ОДРЖИВО ПОСЛОВАЊЕ ПРИВРЕДНИХ СУБЈЕКАТА

### Апстракт

*Технолошки ниво савремених привредних субјеката уско је повезан са модерним трендовима нових технологија на глобалном нивоу. Револуционарни трендови развоја нових технологија креирају савремене и ефикасне привредне субјекте и омогућавају им пословање на светском тржишту кроз различите информа-*

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тизоване структурне моделе. Привредни субјект који стреми успеху, посебну пажњу придаје технолошком побољшању као излазном индикатору одрживог пословања које укључује усвајање одрживог развоја у пословну стратегију. Предмет истраживања у овом раду је валидација технолошког квалитета и селектованих фактора релевантних за одрживо пословање привредних субјеката. Основна идеја је проналажење централне вредности оствареног технолошког нивоа националних привредних субјеката као релевантног фактора генерисања њихове одрживости на тржишту. Претпоставка је да ниво пословања и дужина функционисања играју значајну улогу на разлике у технолошком нивоу националних привредних субјеката.

**Кључне речи:** технолошки ниво, одрживо пословање, привредни субјекти, ниво пословања, дужина функционисања.

## Introduction

The issues of sustainable business (Ruggerio, 2021) and the overall complexity of technological changes are crucial subjects of contemporary social and economic research (Šušić, 2018). The concept of sustainable business has become key to creating a sustainable future, addressing the impact of business on the environment and society. Corporate social responsibility, through its policies and practices that consist of economic, social, and ecological dimensions, plays a pivotal role in achieving sustainable development, thus interlinking socially responsible business practices (Grubor et. al., 2020) and sustainable development. Clearly, the focus today is on the economy, organization, and technology. All entities in this chain are interconnected through various networks, whether social, economic, or organizational, in which they play different roles. Each network represents an organization with its rules and structure, influencing people's lives in unique ways.

Technology, as a concept, refers to the industrial revolution, information technologies, and everything related to economic development in environments increasingly dependent on infrastructure facilitating the functioning of individuals and organizations, including computers, smart devices connected to the internet, GPS, and other tools that have become indispensable in daily life (<https://sr.nsp-ic.org/ventajas-desventajas-3892#menu-1>). Technological changes bring modifications in the approach to inputs or methods that alter measurable performance (Sabherwal & Jeyaraj, 2015) of products or processes. Economic entities utilize specific technologies that include accumulated and materialized knowledge and experience from previous generations in generating product quality and high growth (Petrović & Leković, 2019; Buntak, et. al. 2011).

The rapid pace of technological development is undeniable, with trends (Abimbola, 2021) offering economic entities new competencies (Torkkeli & Tuominen, 2002). The expansion of technological progress has reduced monopolies on knowledge, allowing anyone organizationally and financially prepared to compete in the global market. Based on increasingly innovative technological possibilities (Stanković, 2020), new products and ways to meet both old and new needs are being developed. Accelerated technological development (Đuričić et. al. 2009), which has generated numerous new technologies, confirms its role

as the strongest driver of sustainable development (Beckerman, 2002) for contemporary economic entities. This foundation facilitates their adaptation to new economic structures and the growing need to maximize the use of new technologies and innovations (Bharadwaj, 2000). Given the different technologies used by economic entities, their organizational structure will also vary, influenced by changes in the environment.

New technologies and innovations (Lecerf & Omrani, 2019; Zhu et. al. 2006) offer more economical operations, with an increasing number of technological solutions already in widespread use or entering the mainstream. Modern technologies are applied in product promotion, sales, goods delivery, services provision, corporate governance, and supporting management or supervisory functions. The influence of new technologies also alters the market structure of capital (Mudrinić, 2022, p. 95), leading to new organizational forms of business operations. These technologies are global, interconnected, decentralized, autonomous, and automated. In this sense, “the flow of information will be unstoppable and in real-time; everything will be personalized, and individual desires and needs will be anticipated by companies to design products and services; existing products and entities will be broken down into the simplest possible parts, which will then be combined and recombined in infinite ways to meet human curiosity about what can be made or destroyed and recreated...” (Kelly, 2016).

The desire to adopt advanced technologies to accelerate business capabilities (Mitra, 2005) is an undeniable need for national economic entities, regardless of their duration of operation or level of business. Each entity must understand the technological environment, including the available market technologies they do not possess or utilize. To stay competitive, technological competence and cost capability (Stoiljković et. al. 2024) are crucial for the sustainable operations of economic entities (Blewitt, 2008), and continuous investment is required (Margaritis & Psillaki, 2010).

Technological competence (Acur et.al. 2010; Duysters, Hagedoorn, 2000) can accumulate but also erode and disappear, losing the competitive advantage (Kurti, 2016), potentially jeopardizing the entity's survival. As the number of national economic entities utilizing new technologies increases, other national organizations, if they wish to remain on the market (Oliveira, Martins, 2011), must introduce new technologies through innovations, licensing, international technology transfer, etc. (Glass et. al. 2008). New technologies will require changes in organizational structures (Edgar & Lockwood, 2008), sometimes significant, and management must be prepared for this.

To fully benefit from technological and digital advancement, it is critical for Serbian enterprises to be technologically aware and adaptable to acquiring necessary skills, cultural changes, and the continuous need for adaptation, learning, and corporate governance (Saleem, 2020). This implies that the best offerings from new intensive technologies (Drejer & Sorensen, 2002) should be harnessed to automate business processes and generate sustainable operations and business excellence.

Finally, although the development of new technologies offers numerous advantages, it also introduces substantial risks (<https://www.glasamerike.net/a/a-34-2006-04-13-voa4-86803417/739512.htm>). Thus, there is a need to establish mechanisms within the corporate governance system to manage the risks posed by the implementation of new technologies, to avoid misuse and ensure ethical application (Mudrinić, 2022, p. 95).

## 1. Research subject and methodology

Numerous studies conducted from various perspectives have confirmed the strong need for manufacturing companies to enhance their technological capabilities, as they recognize it as a key tool for improving business performance and sustainable development (Bai et.al. 2023; Boston Consulting Group BCG, 2023; Bazata, 2018; McKinsey & Company 2023), while also serving as an active tool for technological transition in the entity.

This study assumes that in the current economic environment, a high level of technological proficiency is one of the conditions for achieving high business performance in manufacturing entities. The research involves validating selected elements presumed important for improving the sustainable operations of economic entities in Serbia. Relevant parameters considered include the technological level of economic entities, their openness to innovation, the quality of products offered in the market, and their competitive readiness. The focus is primarily on the impact of the relationship between business level and duration of operations on technological quality assessment, along with a comparative analysis of economic entities with specific scopes of operations in evaluating their technological levels. In addition to several essential factors, qualified leadership is certainly a critical prerequisite for creating an entity that ensures sustainable business operations. The duration of business operations and the scope of functioning influence technological quality, which contributes to generating sustainable development and gaining an edge in creating value and quality products for the market.

The research was conducted as a cross-sectional deterministic study. The methodological framework included an exploratory approach, bibliographic speculation, and statistical comparison methods. A purposeful selection of 104 companies chosen from the Serbian Business Registers Agency's database served as the basis for the study, including (16%) micro-organizations, (33%) small organizations, (31%) medium-sized organizations, and (20%) large organizations. The research was conducted using an online questionnaire. The survey was anonymous, and responses were provided by owners or senior managers within the organizations. The survey aimed to collect data regarding the significance of national firms' technological accomplishments and to evaluate their intensity in the context of the interaction between business duration and scope. The responses were processed using ANOVA and non-parametric  $\chi^2$  tests, and the data was presented in tabular and descriptive formats.

## 2. Results and discussion

A reliable assessment of technological competence within the framework of sustainable business practices enables the management of national economic entities to make more informed strategic decisions and minimize the risk of errors caused by incorrect assumptions in evaluating the level of technological preparedness. Descriptive statistics were used to assess business operations as variables whose values depend on independent variables, with a focus on the technological level of economic entities to identify connections and relationships while comparing selected characteristics. Respondents from economic entities operating at different levels and with specific durations of operation were asked to evaluate selected parameters from a set of questions in a survey, rating them on a scale from 1 to 5, where 1 is

the lowest score and 5 is the highest. The results for individual selected characteristics, with emphasis on technological level, are presented in Table 1.

Table 1. Validation of technological quality and selected factors relevant for the sustainable operations of national economic entities

Properties of elements	Af		Rf <sup>1</sup>		Af		Rf <sup>2</sup>		Af		Rf <sup>3</sup>		Af		Rf <sup>4</sup>		Af		Rf <sup>5</sup>		Estimates
Technological intensity of the business entity	0	0	14	10,0	21	15,4	58	42,7	46	33,7											
The openness of the business entity to innovation	2	1,8	5	3,7	37	27,1	45	33,4	49	35,4											
The quality of the product on the market where the business entity operates	2	1,6	11	8,2	49	36,1	41	30,2	35	25,8											
The degree of competitive readiness of the business entity	4	2,9	9	6,2	31	22,9	58	42,3	37	27,2											

Note: Af – absolute frequencies; Rf – relative frequencies (percentages).

Source: Authors

Table 2 shows the ranking of the listed characteristics based on the average scores (mean values) for each attribute.

Table 2. Ranking of considered properties

Mean values	Technological intensity of the company	The company's openness to innovation	Product quality on the market where the company operates	The degree of competitive readiness of the company
	3,98	3,99	3,71	3,87
Attribute rank	1	5	4	2

Source: Authors

The obtained results indicate that the technological level in economic entities, along with their openness to innovations covered by the sample, is rated the highest (with an average score close to 4) compared to other considered characteristics. The potential influence of the length of operation and the level of business (local, national, regional, and international) on the differences in the characteristics of economic entities was evaluated through a two-factor analysis, as a prerequisite for national economic entities to achieve a respectable and sustainable level of business and development. A significance level of 0.05 was adopted (for all values of  $\text{Sig} \leq 0.05$ , there is a statistically significant difference). The characteristic focused on in the study was the technological level of economic entities. Mean values for the technological level of domestic economic entities, operating for different periods and in various markets, are provided in Table 3, for every level and duration of operation. N is

the number of respondents in the sample, and the standard deviation (Std. Deviation) is the deviation of the mean score. It is evident that the technological level was rated the highest by economic entities operating in regional markets, particularly those operating between 6 and 10 years and between 21 and 30 years.

Table 3. Mean score of technological intensity in economic entities

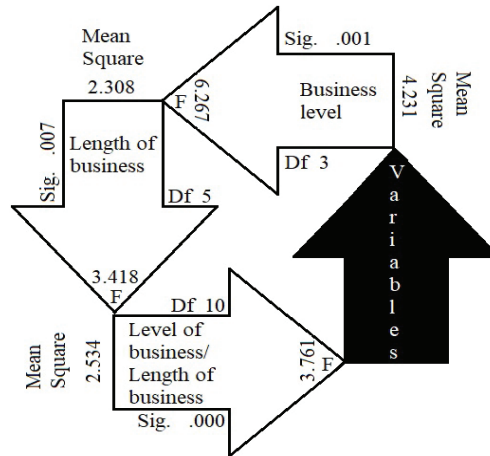
Business level	Length of an organization's business	Mean	Std. Deviation	N
Local market	From 6 to 10	3.00	1.155	4
	From 11 to 20	4.00	.000	3
	From 21 to 30	4.50	.535	8
	Over 40 years	2.00	.000	2
	Total	3.76	1.091	17
National market	Up to 5	4.71	.488	7
	From 6 to 10	4.00	.000	2
	From 11 to 20	3.11	1.054	9
	From 21 to 30	3.20	.919	10
	From 31 to 40	4.00	.000	2
	Over 40 years	3.50	.577	4
	Total	3.62	.985	34
Regional market	From 6 to 10	5.00	.000	2
	From 11 to 20	3.50	.535	8
	From 21 to 30	5.00	.000	4
	Over 40 years	4.44	.527	9
	Total	4.26	.752	23
International market	From 6 to 10	3.93	1.223	15
	From 11 to 20	4.42	.515	12
	From 21 to 30	3.90	.995	21
	From 31 to 40	4.00	.000	3
	Over 40 years	4.27	.786	11
	Total	4.08	.929	62
Total	Up to 5	4.71	.488	7
	From 6 to 10	3.87	1.180	23
	From 11 to 20	3.78	.870	32
	From 21 to 30	3.95	.999	43
	From 31 to 40	4.00	.000	5
	Over 40 years	4.04	.916	26
	Total	3.96	.957	136

*Source: Authors*

The impact of the interaction between the duration of operation and the level of operation on the technological intensity rating is shown in Table 4. In the column for Business Level/Duration of Operation, Sig = 0.000, which is less than 0.05, suggesting that significant differences exist in the technological level ratings of economic entities operating at different levels and for different periods. There is a statistically significant interaction effect between

the business level and duration of operation. After analyzing the overall impact, the study moved on to assess the individual impacts. In particular, a value of 0.001 was discovered in the Sig column for business level, which is less than 0.05, indicating that the business level of economic entities has a significant impact on the ratings of their technological intensity as a key factor in sustainable operations. Similarly, Sig for the duration of operation was less than 0.05, at 0.006, also significantly influencing differences in the technological level rating of the economic entity. It can be concluded that both the level of business and duration of operation play a significant role in the technological differences observed among companies.

Table 4. The impact of interaction between business level and duration of operation on the evaluation of technological intensity in national economic entities



Source: Authors

It is evident that there are distinct individual impacts of business level and duration of operation on the technological quality of economic entities. Tukey's test was then used to determine whether economic organizations had significantly different ratings according to their business level. Table 5 presents that significant differences exist in the technological intensity between entities operating in national and regional markets and between those operating in national and international markets.



Table 5. Comparative analysis of national economic entities with different business levels in technological intensity ratings

(I) Business level of the business entity	(J) Business level of the business entity	Mean difference (I-J)	Standard deviation	Deviation significance (Sig)	95% Confidence interval	
					Lower limit	Lower limit
Local market	National market	.15	.244	.931	-.49	.78
	Regional market	-.50	.263	.239	-1.18	.19
	International market	-.32	.225	.499	-.90	.27
National market	Local market	-.15	.244	.931	-.78	.49
	Regional market	-.64(*)	.222	.023	-1.22	-.07
	International market	-.46(*)	.175	.046	-.92	-.01
Regional market	Local market	.50	.263	.239	-.19	1.18
	National market	.64(*)	.222	.023	.07	1.22
	International market	.18	.201	.806	-.34	.70
International market	Local market	.32	.225	.499	-.27	.90
	National market	.46(*)	.175	.046	.01	.92
	Regional market	-.18	.201	.806	-.70	.34

Source: Authors

## Conclusion

This study was conducted on a sample of national economic entities of varying sizes, levels, and durations of operation, with proportional representation based on size. The assumptions presented in this study indicate that sustainable business operations are not achievable unless management strengthens the technological competence of the economic entity. The results reveal significant differences in the technological competence ratings of economic entities operating at different business levels and durations. Factors such as the duration of operation and the scope of operations, which were the focus of the evaluation, both individually and in interaction, confirm the fact that the technological level can be a decisive factor in the quality of products offered by economic entities in the market.

Further conclusions indicate that the technological level of economic entities is rated highest by those operating in regional markets, particularly those operating for 6 to 10 years and 21 to 30 years. The impact of the interaction between business level and duration of operation is statistically significant. Tukey's test reveals that individual impacts of the business level and duration of operation on technological specifics differ across economic entities. Notably, there are differences in the technological level of entities operating in national and regional markets compared to those operating in national and international markets.



In conclusion, the results suggest that the technological level is fundamental to the sustainable survival of national economic entities in the market, into which continuous investment is necessary. The duration of operation and the level of operation significantly affect the properties of entities considered business-sustainable. The technological level of national economic entities holds potential for changes that can reduce the negative impact on the environment. To generate a business future through technology, economic entities must strengthen their awareness of improving the technical-technological foundation of operations and adaptability in acquiring necessary skills and continuous correction and learning.

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