



# SDGs Risks and Digital Approach to Managing Them

Elena G. Popkova 

## Abstract

This paper aims to identify sustainable development risks in the Decade of Action and develop a digital approach to managing them. Using regression analysis, the author carries out a factor analysis of the implementation of the SDGs in 2021 and identifies sustainable development risks in the Decade of Action. A forecast of sustainable development in the Decade of Action under the influence of risks is made. For this purpose, the author applies horizontal analysis to study the dynamics of changes in the sustainable development risks in the Decade of Action based on relevant data for 2020–2021 and projected data for 2022–2027. A forecast of sustainable development in the Decade of Action under the influence of risks is made. The author compiles a sustainable development risk profile for the Decade of Action and proposes forward-looking risk management measures based on digitalization. The author concludes that crises, slow economic growth, and national budget deficits are sustainable development risks that threaten the implementation of the SDGs in the Decade of Action. The proposed digital approach to managing risks of sustainable development in the Decade of Action, which provides a targeted impact on each of the risks of sustainable development in the Decade of Action, solves the identified problem. The theoretical significance of the author's conclusions is related to the fact that they formed a clear understanding of the risks of sustainable development. The practical relevance of the digital approach to managing risks of sustainable development is related to the fact that it will make it possible to realize the fullest potential of sustainable development of the world economic system in the Decade of Action.

## Keywords

Risks · Sustainable development · Sustainable Development Goals (SDGs) · Decade of Action · Digital approach · Risk management

## JEL Codes

D81 · G32 · Q01 · O31 · O32 · O33 · O38

## 1 Introduction

Sustainable development is a contemporary concept of balancing social, environmental, and economic interests in developing economic systems. This concept has gained a serious international institutional basis with the adoption of the 17 Sustainable Development Goals (SDGs) under the auspices of the United Nations (UN). In 2020, the phase of active implementation of the SDGs, dubbed the Decade of Action, began, as all the planned results must be achieved in 10 years—until 2030.

In this connection, the identification of sustainable development risks in the Decade of Action that pose a threat to the implementation of the SDGs, as well as the identification of prospects for managing these risks, is of great relevance. Risks are potential barriers to sustainable development that hinder the implementation of the SDGs. Without considering risks, the road map for sustainable development in the Decade for Action is incomplete, hampering its implementation.

The problem of risk has become even more acute in the Decade of Action, as the world economic system has entered the downward phase of the long wave of the economic cycle since 2020. The increased risk component of economic activity is a characteristic feature of this phase. The problem is that the increased risks hinder the potential for sustainable

E. G. Popkova (✉)  
RUDN University, Moscow, Russia

development of the world economic system in the Decade of Action.

The practical experience of individual countries, noted in the works of Nasiri et al. (2022), Rosamartina et al. (2022), and Xia et al. (2022), testifies to the significant contribution of digital technologies to the sustainable development of their economic systems. Nevertheless, the available publications reveal this contribution only in a fragmented way, noting the benefits of isolated technologies and only for certain SDGs. In this regard, there is a need for a systemic view of the prospects for using digital technology to manage sustainable development risks. Based on the above, this research aims to identify sustainable development risks in the Decade of Action and develop a digital approach to managing them.

## 2 Literature Review

This research draws on the science of sustainable development. A content analysis of the existing literature highlighted two potential factors of sustainable development risks. The first potential factor includes crises and slow economic growth. The COVID-19 pandemic and crisis caused a recession in the world economy in 2020. Not having recovered from it in 2021 due to periodic lockdowns in 2022, the world economic system faced a worldwide energy crisis and disruption of global value chains due to tightening international economic sanctions. This has put considerable pressure on green initiatives worldwide. This factor is indicated in the works of Arribas-Ibar et al. (2021), Bendell (2022), Geng et al. (2022), and Koliopoulos et al. (2022).

The second potential risk factor is the deficit in national budgets. To maintain socio-economic stability, governments worldwide are forced to increase state budget expenditures at a time when revenue generation opportunities are limited. This can lead to a reduction in funding for sustainable development and, therefore, requires attention and management. This factor is noted in the works of Canelli et al. (2022), Chien et al. (2022), Manzilati and Prestianawati (2022), Popkova et al. (2019), and Popkova and Sergi (2021).

The literature review showed that the described factors of sustainable development risks are mostly elaborated at the level of basic science, while their actual impact on the implementation of the SDGs in practice is underdeveloped and remains uncertain. This is a gap in the literature. The need to fill the identified gap is due to the fact that the lack of a clear understanding of the risks of sustainable development hinders the development of a scientific approach to managing these risks, which jeopardizes the success of the Decade of Action.

The insufficient evidence base does not allow us to assess the risks of sustainable development. Nevertheless, the accumulated scientific knowledge allows us to formulate

the hypothesis of this research, which is that crises and slow economic growth, as well as the deficit of public budgets of countries, represent risks for sustainable development in the Decade of Action. To fill this gap and test the hypothesis, this research conducts a factor analysis of sustainable development in the Decade of Action, making it possible to assess the nature and strength of the influence of assumed risk factors on the implementation of the SDGs.

## 3 Materials and Method

To obtain the most reliable results, this research uses a quantitative-qualitative methodology in accordance with a system approach. The study is conducted in two stages. The first step identifies sustainable development risks in the Decade of Action. A factor analysis of the implementation of the SDGs in 2021 is conducted. The method of regression analysis is used to model the dependence of the index of sustainable development ( $y$ ), calculated by UNDP (UNDP, 2022), on potential risk factors: gross domestic product in constant prices ( $x_1$ ) and the state budget balance (as the difference between income and expenditures,  $x_2$ ) based on the statistics from the International Monetary Fund (2022). The research model is as follows:

$$y = a + b_1 * x_1 + b_2 * x_2 \quad (1)$$

The reliability of the regression model is evaluated using Fisher's F-criterion and the multiple correlation coefficient. The second step is to make a forecast of sustainable development in the Decade of Action under the influence of risks. Using the method of horizontal analysis, the author studies the dynamics of changes in the factors of sustainable development risks in the Decade of Action based on actual data for 2020–2021 and forecast data (forecast of the International Monetary Fund, 2022) for 2022–2027. Based on the obtained regression model (1), a forecast of sustainable development in the Decade of Action is made under the influence of risks.

The empirical basis for this research is presented in the Mendeley Data public repository (Popkova, 2022). The research sample included 144 countries with different income levels and geographic locations. These include 19 countries in Eastern Europe and Central Asia (13.19%), 20 countries in East and South Asia (13.89%), 20 countries in LAC (13.89%), 13 countries in MENA (9.03%), two countries in Oceania (1.39%), 35 countries in OECD (24.31%), and 35 countries in Sub-Saharan Africa (24.31%).

The third phase of the research develops a digital approach to managing sustainable development risks in the Decade of Action. A qualitative interpretation of the quantitative results is used to build a risk profile of sustainable development in

the Decade of Action and propose forward-looking risk management measures based on digitalization.

## 4 Results

### 4.1 Sustainable Development Risks in the Decade of Action

To determine the impact of potential risk factors on sustainable development by regression analysis, the author conducted a factor analysis of the index of sustainable development in 2021. As a result, the following econometric model was obtained:

$$y = 65.5179 + 0.5641 \cdot x_1 + 0.4078 \cdot x_2 \quad (2)$$

According to the obtained model (2), when the economic growth rate accelerates by 1% per year, the sustainable development index increases by 0.5641 points. An increase in the state budget balance by 1% of GDP achieves an increase in the sustainable development index of 0.4078 points. To test the reliability of model (2), let us turn to the detailed results of the regression analysis (Table 1).

According to Table 1, the standard error was relatively small and amounted to 13.7495. The resulting t-statistics was 2.4013 for factor variable  $x_1$  and 1.4755 for factor variable  $x_2$ . The significance of  $F$  was 0.0267. The observed value of  $F$  was 3.7160. For 144 observations and 2 factor variables ( $k_1 = 2$ ;  $k_2 = 144 - 2 - 1 = 141$ ), the tabulated  $F$  at the 0.05 significance level was 3.07. Since the observed  $F$  exceeded the tabulated  $F$  ( $3.7160 > 3.07$ ), model (2) is reliable at a given significance level of 0.05.

Considering the obtained multiple correlation coefficient, the change in the sustainable development index by 22.38% is explained by the change in the studied factor variables. At

the level of individual regions of the world, higher values of correlation coefficients were obtained. Thus, in the MENA countries, the correlation of the sustainable development index with the rate of economic growth was 53.93%; in East and South Asia, the correlation of the sustainable development index with the state budget balance was 79.79%. This also confirms the reliability of model (2).

### 4.2 Forecast of Sustainable Development in the Decade of Action Under the Influence of Risks

To determine the future impact on the index of sustainable development of selected factor variables with a proven impact, the author used the method of horizontal analysis to study the dynamics of changes in the risk factors of sustainable development in the Decade of Action based on relevant data for 2020–2021 and forecast data (International Monetary Fund, 2022) for 2022–2027. The obtained results are shown in Fig. 1.

As shown in Fig. 1, according to the forecast of the International Monetary Fund (2022), the rate of economic growth in the world economy in 2027 will be at a level of 3.39%. The state budget balance in 2027 will average – 1.86% of GDP worldwide. By substituting the expected (most likely) values of the factor variables in the model (2), a forecast of sustainable development in the Decade of Action under the influence of risks is made (Fig. 2).

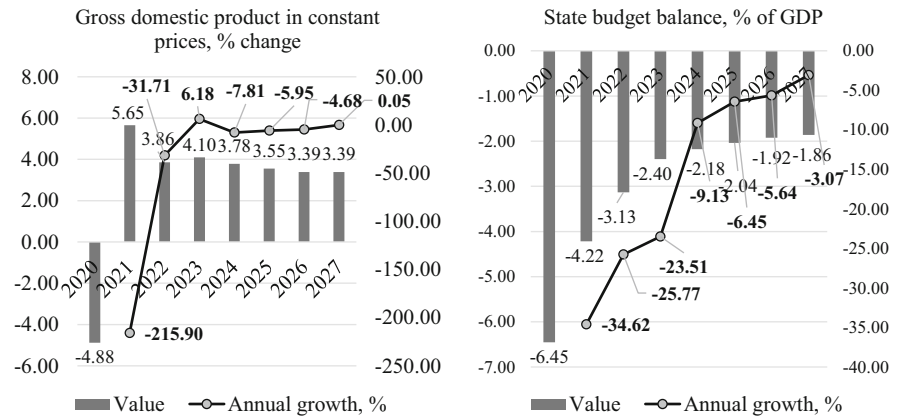
As shown in Fig. 2, the forecast shows that the Decade of Action (by 2027) will see a 33.31% decrease in economic growth compared to 2021 and a 59.74% increase in the state budget balance compared to 2021. Because of these circumstances, the Sustainability Index will increase by 0.26%: from 66.50 points in 2021 to 66.67 points in 2027. This indicates the serious impact of the identified risk factors,

**Table 1** Regression analysis of the dependence of the index of sustainable development on risk factors

<i>Regression statistics</i>						
Multiple R	0.2238					
Standard error	13.7495					
Observations	144					
<i>Variance analysis</i>						
	df	SS	MS	$F$	Significance of F	
Regression	2	1405.0021	702.5011	3.7160	0.0267	
Balance	141	26655.7175	189.0476			
Total	143	28060.7196				
<i>Parameters of the regression model</i>						
	Coefficients	Standard error	t-statistics	$P$ -value	Lower 95%	Upper 95%
Constant	65.5179	2.0334	32.2208	0.0000	61.4980	69.5378
Gross domestic product in constant prices, % change	0.5641	0.2349	2.4013	0.0176	0.0997	1.0285
State budget balance, % of GDP	0.4078	0.2764	1.4755	0.1423	–0.1386	0.9543

Source: Calculated and compiled by the author

**Fig. 1** The dynamics of sustainable development risks in the Decade of Action. *Source* Calculated and compiled by the authors based on the materials of the International Monetary Fund (2022)



putting the implementation of the SDGs in the Decade of Action at risk of failure. This underscores the need to manage the identified sustainable development risks in the Decade of Action.

### 4.3 Digital Approach to Sustainable Development Risk Management in the Decade of Action

For the development of the risk profile of sustainable development in the Decade of Action, the authors carried out a qualitative analysis of the quantitative results (Table 2).

As shown in Table 2, the following sustainable development risks are highlighted in the Decade of Action:

- The risk of reduced opportunities for economic growth and development. To reduce this risk, it is recommended to develop Industry 4.0 and maximize its potential to act as a growth vector for the digital economy;
- The risk of accepting higher social and environmental costs of economic growth to accelerate it. To manage this risk, the proliferation of responsible digital technologies that reduce the social and environmental

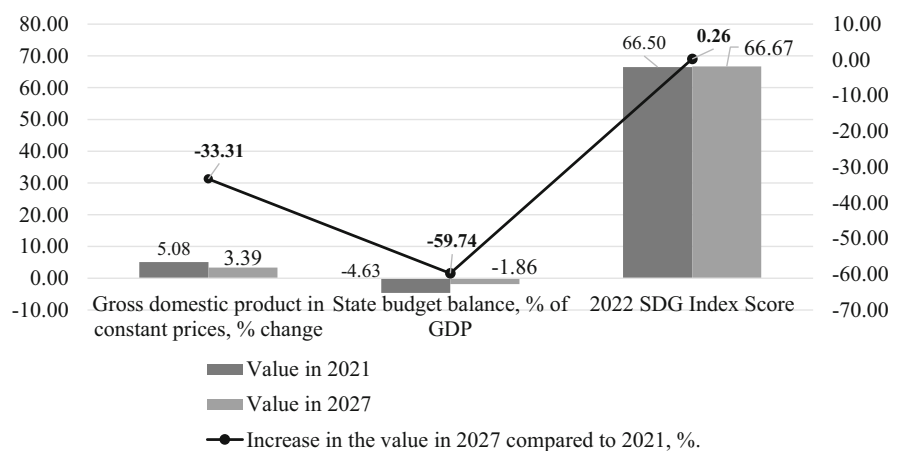
costs of economic growth, such as smart climate-resilient technologies, is proposed;

- The risk of a sustainability financing gap. It is advisable to manage this risk through the development of digital green finance (e.g., green blockchain);
- The risk of reduced solvent demand for responsible business products. To reduce this risk, the development of electronic green value chains, which will increase transparency and reduce the cost of responsible business products, is proposed to stimulate demand growth.

## 5 Conclusion

Thus, the research filled the gap in the literature and proved the hypothesis put forward. The research results suggest that crises and slow economic growth, as well as government budget deficits, are risk factors for sustainable development in the Decade of Action. The forecast (based on the materials of the International Monetary Fund (2022)) indicates the serious influence of the identified risk factors, according to which the Sustainable Development Index in 2027 may remain at the level of 2021 due to the prolonged crises, the

**Fig. 2** Forecast of sustainable development in the Decade of Action under the influence of risks. *Source:* Calculated and developed by the author



**Table 2** The risk profile of sustainable development in the Decade of Action and risk management measures based on digitalization

Factors of sustainable development risks	Sustainable development risks	Risk management measures based on digitalization
Crises and slow economic growth	The risk of reduced opportunities for economic growth and development	Industry 4.0 as a growth vector for the digital economy
	The risk of accepting higher social and environmental costs of economic growth to accelerate it	The spread of responsible digital technologies that reduce the social and environmental costs of economic growth
Deficits of state budgets of countries	The risk of a financing gap for sustainable development	The development of digital green finance
	The risk of reduced solvent demand for the products of a responsible business	The development of electronic green value chains

Source: Developed by the authors

slow pace of economic growth, and the deficit of state budgets of the countries worldwide.

The proposed digital approach to sustainable development risk management in the Decade of Action, which provides a targeted impact on each of the risks of sustainable development in the Decade of Action, will help solve the identified problem. The author's approach involves the comprehensive implementation of the following risk management measures for sustainable development in the Decade of Action with the support of digitalization: (1) the development of Industry 4.0 and the fullest disclosure of its potential to act as a growth vector for the digital economy; (2) the spread of responsible digital technologies that reduce the social and environmental costs of economic growth; (3) the development of digital green finance; (4) the development of electronic green value chains.

The contribution of this research to the literature consists of an in-depth exploration of sustainable development risks at the empirical level of research. The theoretical significance of the author's conclusions is related to the fact that they formed a clear understanding of the risks of sustainable development and proposed a scientific approach to managing these risks. The practical significance of the author's recommendations is that the proposed digital approach to managing sustainable development risk allows unlocking the fullest potential of the SDGs and ensuring the fullest realization of the sustainable development potential of the world economic system in the Decade of Action.

## References

- Aribas-Ibar, M., Nylund, P. A., & Brem, A. (2021). The risk of dissolution of sustainable innovation ecosystems in times of crisis: The electric vehicle during the COVID-19 pandemic. *Sustainability*, *13*(3), 1319., 1–14. <https://doi.org/10.3390/su13031319>
- Bendell, J. (2022). Replacing sustainable development: Potential frameworks for international cooperation in an era of increasing crises and disasters. *Sustainability*, *14*(13), 8185. <https://doi.org/10.3390/su14138185>
- Canelli, R., Fontana, G., Realfonzo, R., & Veronese Passarella, M. (2022). Is the Italian government debt sustainable? Scenarios after the COVID-19 shock. *Cambridge Journal of Economics*, *46*(3), 581–587. <https://doi.org/10.1093/cje/beac014>
- Chien, F., Chau, K. Y., Aldeehani, T. M., Huy, P. Q., Tan, L. P., & Mohsin, M. (2022). Does external debt as a new determinants of fiscal policy influence sustainable economic growth: implications after COVID-19. *Economic Change and Restructuring*, *55*(3), 1717–1737. <https://doi.org/10.1007/s10644-021-09365-1>
- Geng, J., Haq, S. U., Abbas, J., Ye, H., Shahbaz, P., Abbas, A., et al. (2022). Survival in pandemic times: Managing energy efficiency, food diversity, and sustainable practices of nutrient intake amid COVID-19 crisis. *Frontiers in Environmental Science*, *10*, 945774. <https://doi.org/10.3389/fenvs.2022.945774>
- International Monetary Fund. (2022). *World Economic Outlook Database, April 2022*. Accessed September 8, 2022, from <https://www.imf.org/en/Publications/WEO/weo-database/2022/April>
- Koliopoulos, T., Papakonstantinou, D., Ciarkowska, K., Antonkiewicz, J., Gambus, F., Mebarek-Oudina, F., et al. (2022). Green designs in hydraulics—Construction infrastructures for safe agricultural tourism and sustainable sports tourism facilities mitigating risks of tourism in crisis at post COVID-19 era. In J. V. d Carvalho, P. Liberato, & A. Peña (Eds.), *Advances in tourism, technology and systems* (pp. 37–47). Springer. [https://doi.org/10.1007/978-981-16-9701-2\\_4](https://doi.org/10.1007/978-981-16-9701-2_4)
- Manzilati, A., & Prestianawati, S. A. (2022). Informal financing or debt traps: Are the UN sustainable development goals being met in emerging economies? *Review of International Business and Strategy*, *32*(1), 132–145. <https://doi.org/10.1108/RIBS-01-2021-0011>
- Nasiri, M., Saunila, M., Rantala, T., & Ukko, J. (2022). Sustainable innovation among small businesses: The role of digital orientation, the external environment, and company characteristics. *Sustainable Development*, *30*(4), 703–712. <https://doi.org/10.1002/sd.2267>
- Popkova, E. G. (2022). Data Set: Sustainable development risks in the decade of action. *Mendeley Data*, *VI*. <https://doi.org/10.17632/97s3bzjj6s.1>
- Popkova, E. G., Fetisova, O. V., Zabaznova, T. A., & Alferova, T. V. (2019). The modern global financial system: Social risks vs. technological risks. In E. Popkova (Ed.), *The future of the global financial system: Downfall or harmony* (pp. 1013–1019). Springer. [https://doi.org/10.1007/978-3-030-00102-5\\_107](https://doi.org/10.1007/978-3-030-00102-5_107)
- Popkova, E. G., & Sergi, B. S. (2021). Dataset modelling of the financial risk management of social entrepreneurship in emerging economies. *Risks*, *9*(12), 211. <https://doi.org/10.3390/risks9120211>
- Rosamartina, S., Giustina, S., Domenico, D. F., Pasquale, D. V., & Angeloantonio, R. (2022). Digital reputation and firm performance: The moderating role of firm orientation towards sustainable development goals (SDGs). *Journal of Business Research*, *152*, 315–325. <https://doi.org/10.1016/j.jbusres.2022.07.025>
- UNDP. (2022). *Sustainable development report 2022. From crisis to sustainable development: The SDGs as roadmap to 2030 and beyond*. Accessed September 8, 2022, from <https://www.sdindex.org/reports/sustainable-development-report-2022/>

- 
- Xia, H., Liu, Z., Efremochkina, M., Liu, X., & Lin, C. (2022). Study on city digital twin technologies for sustainable smart city design: A review and bibliometric analysis of geographic information system and building information modeling integration. *Sustainable Cities and Society*, 84, 104009. <https://doi.org/10.1016/j.scs.2022.104009>