"Assessing statistical link between FinTech PEST environment and achievement of SDGs"

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ASSESSING STATISTICAL LINK BETWEEN FINTECH PEST ENVIRONMENT AND ACHIEVEMENT OF SDGs

Abstract

Implementation of SDGs is the unified goal of 193 UN Member States. FinTech plays a crucial role in achieving it. Therefore, the development of FinTech must be facilitated through proper policy-making and public finance, creating beneficial PEST conditions. However, the interaction of the FinTech PEST environment and achievement of SDGs is a topic that has not yet been addressed. The purpose of this study is to assess the link between these two indicators using statistical methods, indicate SDGs having the strongest link to FinTech PEST environment, and explain the interface to facilitate its useful application within government and financial regulations, as well as administration of the state and municipal financial entities. The results show that the economic and investment potential of Northern Europe is caused by the most favorable PEST environment for FinTech sector development, and demonstrate the existence of a statistical link between FinTech PEST environment and SDG4, SDG8, SDG9, SDG16. There is a clear trend – the more favorable the FinTech PEST environment, the better the achievement of SDGs, the better results of Sustainable Finance indicators, and the higher the Sustainable Finance typology assigned to the country. These results suggest that the goals, targets, and indicators of SDG4, SDG8, SDG9, and SDG16 contribute to the formation of a favorable environment and are conductive to the sustainable development of the FinTech industry in a country. Therefore, sustainability in the development of FinTech industry and finance, and the achievement of SDGs, is a circular process of three interacting factors.

INTRODUCTION

In 2015, 193 members of the UN have united the forces and adopted a common 15-year strategy and 17 goals, named the Sustainable Development Goals (SDGs), towards the objective of worldwide sustainable development. From that moment on, ways and means of achieving these goals are sought.

Research over the last 5 years has shown that FinTech, as one of the fastest-growing industries, is one of the main impetuses of sustainable development. There are numerous examples of innovative solutions tackling one or multiple SDGs in the financial sector. Therefore, the aim is currently to promote the development of sustainability-oriented FinTech worldwide. This requires appropriate external conditions at the country level, such as favorable and appropriate government and financial regulations, as well as administration of the state and municipal financial entities. Accordingly, it is crucial to assess the FinTech political, economic, social, and technological (PEST) environment nationwide as well as to assess the links between FinTech PEST environment and the SDGs. However, there are no studies on the relationship between the FinTech PEST environment and the achievement of SDGs.

1. LITERATURE REVIEW

Sustainability and sustainable development are undoubtedly some of the most relevant and discussed topics in the scientific literature these days (Portney, 2015; Sachs, 2015; Scoones, 2016; Weitzman, 2002; Klarin, 2018; Holmberg & Sandbrook, 2019; Ascher & Mirovitskaya, 2020). Particularly, these topics are analyzed due to the impact of sustainable development principles of activity on competitiveness and economic growth at different levels of economic relations – enterprises, regions, countries (Nevado Gil et al., 2020; Muda & Erlina, 2020; Oliinyk et al., 2021). Interest in the subject grew particularly in 2015 when the UN approved the 2030 Agenda for Sustainable Development (Agenda 2030). The main idea behind the Agenda 2030 is to present a set of 17 interlinked global goals that guarantee a better and more sustainable future for all, widely known as the Sustainable Development Goals (SDGs): No Poverty (SDG1), Zero Hunger (SDG2), Good Health and Well-being (SDG3), Quality Education (SDG4), Gender Equality (SDG5), Clean Water and Sanitation (SDG6), Affordable and Clean Energy (SDG7), Decent Work and Economic Growth (SDG8), Industry, Innovation and Infrastructure (SDG9), Reducing Inequality (SDG10), Sustainable Cities and Communities (SDG11), Responsible Consumption and Production (SDG12), Climate Action (SDG13), Life Below Water (SDG14), Life On Land (SDG15), Peace, Justice, and Strong Institutions (SDG16), and Partnerships for the Goals (SDG17) (United Nations General Assembly, 2015). SDGs in the scientific literature are classified into three main areas: SDG6, SDG13, SDG14, SDG15 are attributed to the biosphere or environment, SDG1, SD2, SDG3, SDG4, SDG5, SDG7, SDG11, SDG16 are attributed to the society, SDG8, SDG9, SDG10, SDG12 are attributed to the economy, and SDG17 is named as an overall goal (Folke et al., 2016; Schoenmaker & Schramade, 2019).

Another relevant research topic is FinTech. Interest in the subject grew particularly in 2017 when the steadily and gradually growing industry began to grow much more significantly. Total global investment in FinTech in 2014–2017 ranged between 51 and 74 billion US dollars, while total global investment in FinTech already amounted to 146 billion US dollars in 2018 and 168 billion US dollars in 2019. The growth trend of total global investment in FinTech over the last decade is presented in Figure 1.

As the volume of investments in the FinTech industry grew at such a pace, FinTech has begun to be actively explored as an object of studies by the scientific and policy-making communities aiming to link this industry to sustainable growth and achievement of the SDGs. In 2014, the UN Environment Programme initiated the establishment of the Inquiry into the Design of a Sustainable Financial System (the Inquiry) to refine the efficiency of the financial system achieving a green and inclusive economy, in other words, sustain-
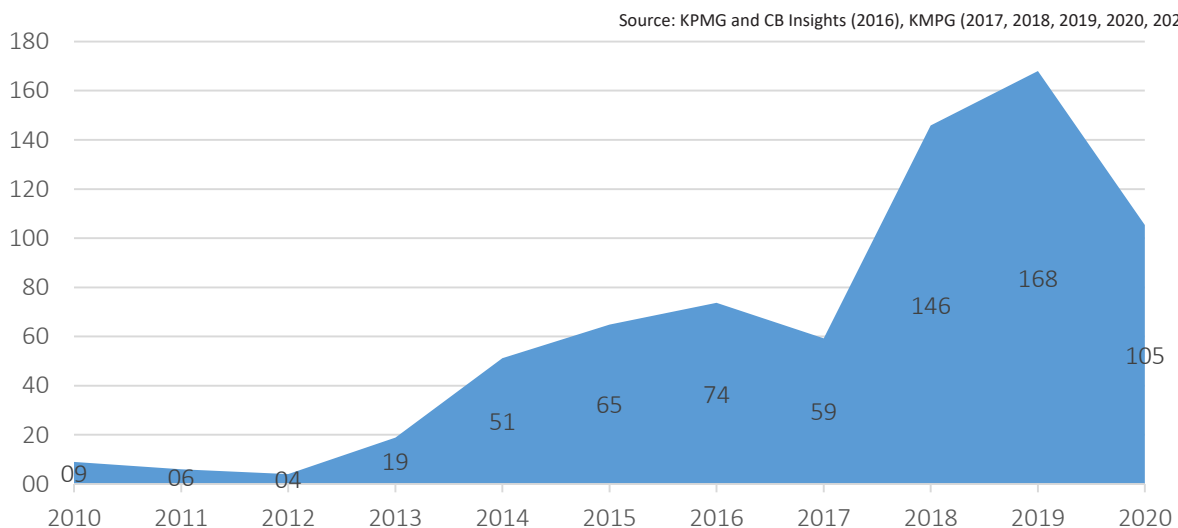

Source: KPMG and CB Insights (2016), KMPG (2017, 2018, 2019, 2020, 2021).

Figure 1. Total global investment in FinTech by year, billions of dollars

able development (Castilla-Rubio et al., 2016). Its pivotal 2015 report revealed that the "quiet revolution" is already happening and it is aimed at the update of the financial system towards sustainable development. Since its launch, the Inquiry has addressed three core questions: (1) When should we take measures to ensure that the financial system is oriented on sustainable development? (2) What measures should we widely implement to focus financial system on sustainable development? (3) How can we implement such measures in the best way? (UNEP, 2015).

As an answer to these questions, FinTech is being considered as one of the main measures. At the end of 2016, the Inquiry released a report on the assessment of FinTech and sustainable development implications, which considers FinTech's potential to support the achievement of SDGs, and therefore notes that transition of the financial system is driven by sustainable development and FinTech, both having the same "basic potential as drivers of change and impact", being suitable for "creating new, sustainable business models" (Castilla-Rubio et al., 2016). This report also presented the concept of "FinTech for sustainable development" (FT4SD) innovation portfolio.

One of the most important global strategic documents of the last decade, the Paris Agreement on climate change, also emphasizes the importance of financial and technological applications for sustainability (UN, 2015).

In 2015, UN Global Compact and KPMG International developed six industry matrices providing industry-specific practical models for each of the SDGs, one of them naming the financial services industry. According to the financial services industry matrix, for SDGs implementation, many solutions will include blended finance, innovative financing mechanisms, and application of new technologies, which in summary is FinTech (UN Global Compact & KPMG International, 2015).

The European Commission has also focused interest on Sustainable Finance and FinTech in pursuing SDGs under the Agenda 2030 with the International Platform on Sustainable Finance, which was launched in 2018, and adoption of the following strategic documents: FinTech Action

plan (2018), Action plan on Sustainable Finance (2018), The European Green Deal growth strategy (2019), European Green Deal Investment Plan (2020), Digital Finance Package (2020) (EC, 2020); and the Sustainable Finance Package (2021) (EC, 2021).

In 2018, the UN Secretary-General established the Task Force on Digital Financing of the SDGs as part of a broader Roadmap for Financing the Agenda 2030, which mandate from 2019 to 2021 was to recommend and catalyze ways to use digitalization to speed up financing of the SDGs. The final report of this task force presented the action agenda for eight different actors and their key roles. FinTech companies and global digital platforms were named as one of the eight factors with key roles of innovating products and services which meet customer demand to channel finance to SDGs as well as committing to principles of SDG-aligned digital financing and developing corporate governance mechanisms to ensure they operationalize them (Bersudskaya et al., 2020).

In 2019, the UN Environment Financial Centres for Sustainability (FC4S) European platform jointly with Stockholm Green Digital Finance introduced a study that signaled the beginning of the FC4S Europe Fintech Innovation Workstream on the intersection of Sustainability – Finance – Technology; it is aimed to assist policymakers in the EU to create a synergy between Sustainable Finance and FinTech (UN Environment FC4S, 2019).

From a scientific study perspective, FinTech supports sustainable development (Cen & He, 2018), is a precondition of any successful SDG strategy (Arner et al., 2020), and suggests how to allocate necessary resources e.g. financial ones for facilitation of sustainable development (Michael, 2020). FinTech strengthens transparency and liability in the financial sector, promotes civic investment and saving, contributes to the implementation of projects aimed at achievement of SDGs, and allocation of funds for these measures; thus, it is crucial for achieving SDGs (Sgro et al., 2019). In addition, FinTech is viewed as a driving-force for sustainable development of the economy because it possesses features that differ from common financial industries (Ryu & Ko, 2020). Roughly

3%-13% (from 50 to 150 billion dollars) of funding required for the achievement of SDGs could come from a "FinTech Dividend" (Michael, 2020). Therefore, scholars are beginning to investigate the narrowing of the interface between FinTech and SDGs by distinguishing certain specific SDGs. Fintech fills up several SDGs, specifically SDG1, SDG5, SDG7, SDG8, SDG9, and SDG10 (Sgro et al., 2019). Meanwhile, Hudaefi (2020) studied the Islamic FinTech promotion of SDGs and showed, that efforts of FinTech to promote the idea of financial inclusion are synonymous with companies' efforts to promote SDG1, SDG2, and SDG10. According to Hausemer (2020), the increasing use of new technologies and FinTechs foster SDG9 by disrupting traditional financial services.

Based on the literature review, it is shown that FinTech undoubtedly plays a key role in achieving SDGs and is among the main drivers. However, FinTech comes across major problems and tasks because it is viewed as crucial for the transition to a sustainable global future (Jones et al., 2017). FinTech industry, like any other industry, is expected to evolve and operate under a particular set of external macro-environmental factors, which are characterized by an extremely high degree of dynamism, complexity, and uncertainty (Shtal et al., 2018). Therefore, it is important to facilitate proper policy-making and public finances on a country level and this way to form favorable external conditions for FinTech development. In 2021 a new FinTech PEST environment assessment tool was presented, which provides an opportunity to assess the favorableness of the country's political, economic, social, and technological environments and the overall environment for the development of the FinTech industry (Pauliukevičienė & Stankevičienė, 2021). However, currently, there are no studies on the relationship between the FinTech PEST environment and achievement of SDGs. All currently available scientific literature only examines FinTech as a possible financial source for achieving SDGs, which suggests that the named link between FinTech and SDGs is one-sided or unreasonably limited and there is a need for a broader approach on the topic. Therefore, this study aims to fill this research gap – assess the statistical link between the FinTech PEST environment and achievement of SDGs, explain the interface, and indicate SDGs having the strongest connection with FinTech PEST environment. For this purpose, the study is designed to assess the hypothesis that there is a statistical link between the FinTech PEST environment and the achievement of certain SDGs.

2. METHODOLOGY

The methodology of this paper consists of the following three steps and methods:

1. Multi-criteria assessment is done for the assessment of the FinTech PEST environment on a country level. For this step, 15 countries were selected to adopt a new FinTech PEST environment assessment tool (Pauliukevičienė & Stankevičienė, 2021). The composition of this tool is presented in Table 1 and the explanation of all indicators is provided in Appendix A. The tool consists of 4 different external environments and 32 indicators. In addition, data collection and partial processing were carried out: country rankings on a global level were expressed as a percentage, values of the indicators were normalized. To assess the performance of each selected country in each environment, multi-criteria assessment (Simple Additive Weighting method) was used – every indicator was multiplied by its weight (Pauliukevičienė & Stankevičienė, 2021), and the numbers obtained after multiplication were summed in each environment (Appendix B). To assess the performance of each selected country in the overall PEST environment, the same principle was applied (Table 2).

2. Correlation analysis is conducted to evaluate a possible statistical link between FinTech PEST environment indicators, determined in the previous step, and the SDG achievement indicators. For this purpose, the data on SDG achievement progress for the same 15 countries was collected (Ziolo et al., 2021) and three different correlation calculation methods were applied – Pearson linear product-moment correlation coefficient, presented as Formula 1, Spearman rank correlation coefficient, presented as Formula 2, and Kendall tau rank correlation coefficient, presented as

Table 1. Assessment tool for FinTech sector environment based on the PEST analysis of FinTech sector external environmental indicators

Environment and its significance	Components of the environment and their significance			Environment and its significance	Components of the environment and their significance		
Political (PE) 0.245	P1	Access to finance	0.110	Social (SE) 0.215	S1	Entrepreneurship	0.136
	P2	Governance efficiency	0.126		S2	Intellectual capital and innovation	0.156
	P3	Government size	0.101		S3	Population	0.081
	P4	Openness to business	0.194		S4	Progress of human development	0.116
	P5	Open Markets	0.138		S5	Social capital	0.104
	P6	Political globalization	0.063		S6	Social globalization	0.079
	P7	Regulation environment for starting a business	0.180		S7	Talent availability	0.195
	P8	Rule of law	0.089		S8	Quality of life	0.133
Economic (EE) 0.239	E1	Competitiveness and attractiveness of the country as a Fintech Nation	0.171	Technological (TE) 0.301	T1	Digital evolution	0.173
	E2	Attractiveness and competitiveness of the leading city as Fintech City	0.151		T2	E-Participation	0.083
	E3	Economic globalization	0.143		T3	Internet speed	0.136
	E4	Inflation rate	0.110		T4	National cybersecurity	0.144
	E5	GDP per capita	0.136		T5	Network readiness	0.115
	E6	Natural capital	0.085		T6	Online service	0.086
	E7	Real GDP growth	0.091		T7	Research and development (R&D)	0.114
	E8	Resource efficiency and intensity	0.113		T8	Telecommunication infrastructure	0.150

Formula 3. The Student's statistical formula was used to determine the significance of the correlation coefficient, presented as Formula 4.

$$r = \frac{\sum(x-\overline{x})(y-\overline{y})}{\sqrt{\sum(x-\overline{x})^2 \sum(y-\overline{y})^2}}, \qquad (1)$$

where x – the value of x (for i-th observation), y – the value of y (for i-th observation).

$$r_s = 1 - \frac{6\sum D^2}{n(n^2-1)}, \qquad (2)$$

where D – the difference between ranks, n – total number of pairs of data.

$$\tau = \frac{n_c - n_d}{n(n-1)/2}, \qquad (3)$$

where n_c – number of concordant pairs, n_d – number of discordant pairs, n – total number of pairs of data.

$$t = \frac{r}{\sqrt{1-r^2}}\sqrt{n-2}, \qquad (4)$$

where r – the value of correlation coefficient, n – number of data pairs in the sample.

3. Comparative data analysis of FinTech PEST environment scores, SDG achievement scores, Sustainable Finance scores, and Sustainable Finance typology was conducted to assess whether any link or trend is visible.

The results of the paper were statistically processed using the Microsoft Excel software.

3. RESULTS

15 European countries from 4 different European regions (UN, 2019) were selected for an assessment of the FinTech PEST environment:

- Eastern Europe: Poland;

- Northern Europe: Denmark, Estonia, Finland, Latvia, Lithuania, Sweden, the United Kingdom;

- Southern Europe: Italy, Portugal, Spain;

- Western Europe: Austria, France, Germany, the Netherlands.

Table 2. FinTech PEST environment assessment tool adaptation

Environment / Country	Political		Economic		Social		Technological		Total environment	
Austria	◔	0.082	○	0.083	◑	0.086	◑	0.090	◔	0.085
Denmark	◕	0.102	◕	0.104	●	0.099	●	0.102	●	0.102
Estonia	●	0.119	◕	0.102	◔	0.077	◑	0.091	●	0.098
Finland	◕	0.102	◕	0.104	◕	0.094	●	0.099	●	0.100
France	◔	0.081	◑	0.093	◑	0.087	◕	0.092	◑	0.089
Germany	◑	0.093	◑	0.092	●	0.103	◕	0.092	◕	0.094
Italy	○	0.071	○	0.079	◔	0.078	○	0.080	○	0.077
Latvia	●	0.110	◔	0.085	○	0.067	○	0.076	◔	0.085
Lithuania	●	0.118	●	0.113	○	0.064	◔	0.084	◕	0.095
Netherlands	◕	0.105	◔	0.091	●	0.101	●	0.100	●	0.099
Poland	◑	0.094	○	0.077	◔	0.076	◔	0.084	◔	0.083
Portugal	◔	0.089	○	0.077	◑	0.086	◔	0.082	◔	0.083
Spain	◔	0.085	◔	0.085	◑	0.087	◑	0.089	◔	0.086
Sweden	◑	0.096	●	0.112	●	0.103	◕	0.096	●	0.101
United Kingdom	◕	0.106	◑	0.094	●	0.103	◕	0.095	●	0.099
Significance of an Indicator	0.245		0.239		0.215		0.301			

The results of data collection and partial processing for the FinTech PEST environment assessment tool (Pauliukevičienė & Stankevičienė, 2021) adaptation are presented in Appendix B, where country rankings on a global level were expressed as percentages and normalized. To fully adapt the FinTech PEST environment assessment tool to the study and assess the performance of each country in each PEST environment, Multi-Criteria Decision Support Method of Simple Additive Weighting (SAW) was used – every indicator value presented in Appendix B was multiplied by its weight, also presented in Table 1. The results of FinTech PEST environment assessment tool adaptation presented in Table 2 and Table 3.

Results show that the most favorable:

- political environment for FinTech sector development is in Northern Europe, especially in the Baltic States – Estonia, Lithuania, and Latvia take all the three first positions, followed by the United Kingdom, the Netherlands, Denmark, Finland, and Sweden. The least favorable political environment for FinTech development is in Austria, France, and Italy;

- economic environment for FinTech sector development is in Northern Europe, with Lithuania, Sweden, and Denmark leading the way. The least favorable economic environment for FinTech development is in Eastern and Southern Europe: in Italy, Poland and Portugal specifically;

- social environment for FinTech sector development is in Northern and Western Europe, whereas the first three places are taken by Sweden, the United Kingdom, and Germany. The least favorable social environment for FinTech development is in all three Baltic States and Poland, which shows, that the social environment is the weak spot in post-Soviet states;

- technological environment for FinTech sector development is in Western and Northern Europe with Finland, Denmark, and the Netherlands leading the way, while the least favorable technological environment for FinTech development is in Southern Europe (Portugal and Italy), Poland, Lithuania, and Latvia.

The study also shows that the most favorable PEST environment for FinTech sector development is in Northern Europe whereas the first seven positions belong to Denmark, Sweden, Finland, the Netherlands, the United Kingdom, Estonia, and Lithuania. The least favorable PEST environ-

Table 3. Values of the FinTech PEST environment assessment presented in descending order

Rank	Political environment		Economic environment		Social environment		Technological environment		Total external environment	
1	Estonia	0.119	Lithuania	0.113	Sweden	0.103	Denmark	0.102	Denmark	0.102
2	Lithuania	0.118	Sweden	0.112	UK	0.103	Netherlands	0.100	Sweden	0.101
3	Latvia	0.110	Denmark	0.104	Germany	0.102	Finland	0.099	Finland	0.100
4	UK	0.106	Finland	0.104	Netherlands	0.101	Sweden	0.096	Netherlands	0.099
5	Netherlands	0.105	Estonia	0.102	Denmark	0.099	UK	0.095	UK	0.099
6	Denmark	0.102	UK	0.094	Finland	0.094	Germany	0.092	Estonia	0.098
7	Finland	0.102	France	0.093	France	0.087	France	0.092	Lithuania	0.095
8	Sweden	0.096	Germany	0.092	Spain	0.087	Estonia	0.091	Germany	0.094
9	Poland	0.094	Netherlands	0.091	Portugal	0.086	Austria	0.090	France	0.089
10	Germany	0.093	Latvia	0.085	Austria	0.086	Spain	0.089	Spain	0.086
11	Portugal	0.089	Spain	0.085	Italy	0.078	Poland	0.084	Austria	0.086
12	Spain	0.085	Austria	0.083	Estonia	0.077	Lithuania	0.084	Latvia	0.085
13	Austria	0.082	Italy	0.079	Poland	0.076	Portugal	0.082	Poland	0.083
14	France	0.081	Poland	0.077	Latvia	0.067	Italy	0.080	Portugal	0.083
15	Italy	0.071	Portugal	0.077	Lithuania	0.064	Latvia	0.076	Italy	0.077

ment for FinTech development is in Eastern and Southern Europe – Poland, Portugal, and Italy take last positions in FinTech PEST environment assessment.

To perform correlation analysis and clarify the strength of the relationship between the FinTech PEST environment and implementation of SDGs, the statistical data of SGDs was used (Ziolo et al., 2021), where the indicators describing the 15 SDGs of the latest strategy for sustainable development were used to calculate the values of SDGs for 2016. However, not all SDGs have an interface with the FinTech sector, since some of them focus on third countries and environmental protection, so the values of eight SDGs were selected for further research, provided in Table 4.

Correlation analysis is one of the main types of analysis to assess the statistical link between the two variables. If the values correlate, then they are dependent (Field et al., 2012). Since the study sample is 15 variables – FinTech PEST environment and SDG achievement values of 15 countries – the correlation between these indicators was evaluated by three calculation methods: Pearson linear, as well as Spearman and Kendall, ranking correlation coefficients.

Table 4. Values and ranks of Sustainable Development Goals for 2016

Country	SDG1		SDG3		SDG4		SDG8		SDG9		SDG11		SDG16		SDG17	
Austria	0.642	4	0.799	4	0.653	6	0.688	5	0.635	7	0.484	9	0.589	6	0.245	9
Denmark	0.545	7	0.677	7	0.748	2	0.757	4	0.692	3	0.506	7	0.822	2	0.536	4
Estonia	0.575	5	0.397	12	0.647	7	0.639	7	0.241	9	0.509	6	0.460	9	0.770	2
Finland	1.000	1	0.633	8	0.631	8	0.629	8	0.650	5	0.400	10	0.927	1	0.267	7
France	0.657	3	0.439	11	0.552	10	0.403	11	0.648	6	0.378	11	0.299	13	0.155	10
Germany	0.399	9	0.604	9	0.443	11	0.805	3	1.000	1	0.699	3	0.660	5	0.374	5
Italy	0.157	15	0.761	5	0.000	15	0.110	15	0.227	11	0.569	5	0.231	15	0.253	8
Latvia	0.321	11	0.059	14	0.423	12	0.420	10	0.206	12	0.000	15	0.366	12	0.368	6
Lithuania	0.223	13	0.000	15	0.684	5	0.459	9	0.232	10	0.293	12	0.512	7	0.146	11
Netherlands	0.572	6	0.915	2	0.710	4	0.923	2	0.653	4	0.855	2	0.733	4	1.000	1
Poland	0.530	8	0.320	13	0.720	3	0.371	12	0.040	15	0.281	13	0.446	10	0.039	13
Portugal	0.299	12	0.593	10	0.265	14	0.358	13	0.122	13	0.198	14	0.406	11	0.000	15
Spain	0.172	14	1.000	1	0.300	13	0.222	14	0.094	14	0.595	4	0.267	14	0.030	14
Sweden	0.862	2	0.814	3	0.859	1	1.000	1	0.851	2	0.484	8	0.796	3	0.605	3
UK	0.325	10	0.747	6	0.608	9	0.663	6	0.489	8	1.000	1	0.492	8	0.129	12

In particular, the correlation between 4 different FinTech environments – political, economic, social, and technological, and SDGs was assessed and presented in Table 5. It should be noted that in some calculation cases the correlation was found to be statistically insignificant. Therefore, these cases are marked in Table 5. In all other cases of calculation, the correlation was found as statistically significant at either the 0.01 level, 0.05 level, or 0.10 level.

The results showed, that when assessing the correlation between the 2 indicators by Pearson, the highest correlation most often occurred in the so-cial FinTech environment, whereas by Spearman and Kendall – in the technological FinTech environment. Pearson is originally intended for a larger sample (equal to or greater than 20), whereas Spearman and Kendall are intended for a small amount of data (Field et al., 2012). The correlation results of Spearman and Kendall are more reliable in this case. Technological FinTech environment is the most significant in assessing the link between different FinTech environments and implementation of SDGs. The assignment of SDGs to different FinTech environments according to the correlation strength where the correlation was found to be statistically significant is presented in Table 6.

Table 5. Kendall, Pearson, and Spearman correlation coefficients measuring the strength of association between FinTech political, economic, social, technological environments and SDG scores

Source: Authors' elaboration (2021).

Correlation coefficient	Environment (political, economic, social, technological)	Indicator	SDG1	SDG3	SDG4	SDG8	SDG9	SDG11	SDG16	SDG17
Pearson	PE	r	.782	.731	.908	.841	.696	.746	.894	.673
		p (-2tailed)	.001	.002	<.001	<.001	.004	.001	<.001	.006
		N	15	15	15	15	15	15	15	15
	EE	r	.803	.768	.913	.809	.758	.788	.913	.698
		p (-2tailed)	<.001	.001	<.001	<.001	.001	<.001	<.001	.004
		N	15	15	15	15	15	15	15	15
	SE	r	.842	.854	.882	.831	.765	.821	.915	.633*
		p (-2tailed)	<.001	<.001	<.001	<.001	.001	<.001	<.001	.011
		N	15	15	15	15	15	15	15	15
	TE	r	.813	.814	.901	.839	.759	.817	.913	.650
		p (-2tailed)	<.001	<.001	<.001	<.001	.001	<.001	<.001	.009
		N	15	15	15	15	15	15	15	15
Spearman	PE	r_s	.071*	−.393*	.411*	.393*	.079*	.000*	.386*	.389*
		p (-2tailed)	.800	.147	.128	.147	.781	1	.156	.151
		N	15	15	15	15	15	15	15	15
	EE	r_s	.404*	−.096*	.536	.561	.600	.154*	.604	.304
		p (-2tailed)	.136	.732	.040	.030	.018	.585	.017	.079
		N	15	15	15	15	15	15	15	15
	SE	r_s	.404*	.632	.204*	.621	.732	.618	.514	.304*
		p (-2tailed)	.136	.011	.467	.013	.002	.014	.050	.271
		N	15	15	15	15	15	15	15	15
	TE	r_s	.664	.439*	.586	.754	.804	.521	.782	.529
		p (-2tailed)	.007	.101	.021	.001	<.001	.046	<.001	.043
		N	15	15	15	15	15	15	15	15
Kendall	PE	tau	.067*	−.219*	.257*	.276*	−.010*	.067*	.276*	.276*
		p (-2tailed)	.767	.276	.198	.166	1	.767	.166	.166
		N	15	15	15	15	15	15	15	15
	EE	tau	.314*	−.048*	.467	.371	.429	.086*	.410	.333
		p (-2tailed)	.113	.843	.018	.060	.029	.692	.038	.092
		N	15	15	15	15	15	15	15	15
	SE	tau	.276*	.524	.162*	.448	.543	.467	.295*	.219*
		p (-2tailed)	.166	.008	.428	.023	.006	.018	.138	.276
		N	15	15	15	15	15	15	15	15
	TE	tau	.448	.352	.410	.543	.600	.410	.619	.352
		p (-2tailed)	.023	.075	.038	.006	.002	.038	.002	.075
		N	15	15	15	15	15	15	15	15

Note: * means that correlation is not statistically significant.

Table 6. Assignment of SDGs to different FinTech environments according to the correlation strength

Environment/Correlation measure	Political	Economic	Social	Technological
Pearson	SDG8	SDG4, SDG17	SDG1, SDG3, SDG9, SDG11, SDG16	–
Spearman	–	–	SDG3, SDG11	SDG1, SDG4, SDG8, SDG9, SDG16, SDG17
Kendall	–	SDG4	SDG3, SDG11	SDG1, SDG8, SDG9, SDG16, SDG17

Table 7. Kendall, Pearson, and Spearman correlation coefficients measuring the strength of association between FinTech PEST environment and SDGs

	Correlation measure	SDG1	SDG3	SDG4	SDG8	SDG9	SDG11	SDG16	SDG17
FinTech PEST environment	Pearson r	.809	.795	.909	.837	.749	.797	.915	.671
	p (2tailed)	< .001	< .001	< .001	< .001	.001	< .001	< .001	.006
	N	15	15	15	15	15	15	15	15
	Spearman r_s	.575	.246*	.657	.764	.739	.386*	.807	.586
	p (2tailed)	.025	.376	.008	< .001	.002	.156	< .001	.021
	N	15	15	15	15	15	15	15	15
	Kendall tau	.410	.162*	.524	.619	.562	.295*	.619	.390
	p (2tailed)	.038	.428	.008	.002	.004	.138	.002	.048
	N	15	15	15	15	15	15	15	15

Note: * means that correlation is not statistically significant.

Second, the correlation between the general FinTech PEST environment and SDGs was assessed and presented in Table 7. The strongest correlation results were obtained by Pearson – the values range from 0.671 to 0.915, which is a strong positive correlation since the value 1 means a perfect positive correlation. Therefore, it can be said that the better the FinTech PEST environment in a country, the better achievement of SDGs and vice versa.

The results of ranking correlation coefficients showed a weaker correlation, compared to the results of the linear correlation coefficient. However, according to Spearman, six out of eight values fall within a range from 0.575 to 0.807, which shows either moderate or strong correlation, and a tendency for high FinTech PEST environment scores go with high SDG scores, and vice versa. According to the results of Kendall, four out of eight values fall within a range from 0.524 to 0.619, which shows a moderate positive correlation and a tendency for high FinTech PEST environment scores to go with high SDG scores, and vice versa.

It should also be noted that in some calculation cases the correlation was found to be statistically insignificant. Therefore, these cases are marked in Table 7. In all other cases of calculation, the correlation was found as statistically significant at either the 0.01 level or 0.05 level.

Table 8 shows the SDG ranking by correlation strength for all three correlation measurement methods where the correlation was found to be statistically significant. According to this ranking, it can be stated that the FinTech PEST environment has the strongest statistical relationship with SDG16, as it ranked first in all three measurement methods. Further ranking differs somewhat depending on the correlation measurement method.

Correlation study support the hypothesis of the paper – there is a statistical link between the FinTech PEST environment and SDG4, SDG8, SDG9, SDG16, where the correlation coefficient was greater than 0.5 for all three correlation measurement methods. Therefore, it can be stated that the FinTech PEST environment and SDG4, SDG8, SDG9, SDG16 are dependent, and the greatest de-

Table 8. SDG ranking according to the strength of association between FinTech PEST environment scores and SDG scores

SDG rank	Pearson	Spearman	Kendall
1	SDG16	SDG16	SDG16 (tie)
2	SDG4	SDG8	SDG8 (tie)
3	SDG8	SDG9	SDG9
4	SDG1	SDG4	SDG4
5	SDG11	SDG17	SDG1
6	SDG3	SDG1	SDG17
7	SDG9	–	–
8	SDG17	–	–

pendence of the scores is between FinTech PEST environment and SDG16.

To visually depict the link between FinTech PEST environment and SDG4, SDG8, SDG9, SDG16, and to visualize the formation of beneficial conditions for the sustainable development of FinTech industry, the scheme of the seventeen SDGs and their relationship with the biosphere and the safe operating space for humanity (Folke et al., 2016), as well as the scheme of sustainable development challenges at different levels (Schoenmaker, 2017) were adapted.

Since SDG4 and SDG16 are among those that have the greatest impact on society, while SDG8 and SDG9 are among those that have the greatest impact on the economy, the creation of beneficial conditions for FinTech sustainable development is based on society – quality education (SDG4) and peace, justice and strong institutions (SDG16) in particular, and the economy – decent work and economic growth (SDG8) as well as industries, innovation, and infrastructure (SDG9), as the main influencing factors and drivers.

To refine the essential characteristics of society and economy, to foster an environment conducive to sustainable FinTech growth, an analysis of goals, targets, and indicators of SDG4, SDG8, SDG9, SDG16, relevant to FinTech development, was conducted (Appendix C). According to this analysis, society was defined as inclusive, and the economy as growing. The visualization of the link between the FinTech PEST environment and four SDGs is presented in Figure 2.

In 2017, a framework for Sustainable Finance was introduced, presenting a Sustainable Finance typology based on the value created – ranking of financial value, social impact, and environmental impact factors as well as the horizon (Schoenmaker, 2017). Ziolo et al. (2021) confirmed the relationship between achievement of SDGs and sustainable financing, which was the strongest in countries that use Sustainable Finance 3.0, oriented to social-environmental impact first and a common good value in the long run. The paper adapts this data by incorporating FinTech PEST environment assessment results and carrying out comparative data analysis to assess whether any link or trend
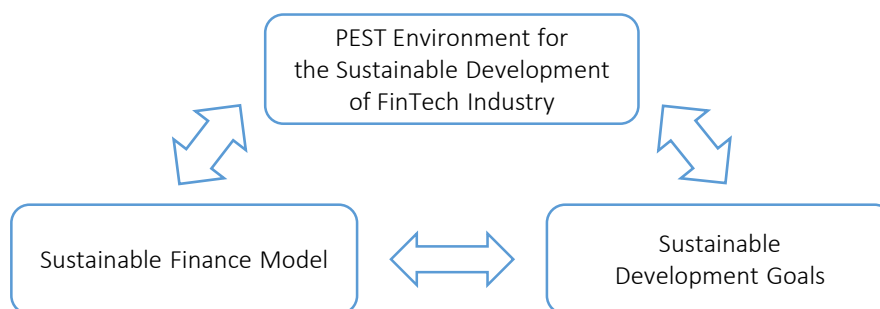
Figure 2. Link between FinTech PEST environment and four SDGs

Table 9. Overall trend among the 15 countries in FinTech PEST environment, SDG achievement, and finance model

Countries listed in descending order by favorableness of FinTech PEST environment	FinTech PEST environment (Pauliukevičienė & Stankevičienė, 2021)		SDG achievement (Sachs et al., 2020)		Finance (Ziolo et al., 2021)		Attribution to a sustainable finance model (Ziolo et al., 2021)		
							Sustainable finance typology (Schoenmaker, 2017, 2019)	Ranking of factors (Schoenmaker, 2017, 2019)	Horizon (Schoenmaker, 2017, 2019)
Denmark	●	0.102	●	0.071	●	0.150	Sustainable finance model 3.0.	S and E > F	Long term
Sweden	●	0.101	●	0.071	◕	0.109	Sustainable finance model 3.0.	S and E > F	Long term
Finland	●	0.100	●	0.070	◕	0.105	Sustainable finance model 3.0.	S and E > F	Long term
Netherlands	●	0.099	◑	0.067	◕	0.117	Sustainable finance model 3.0.	S and E > F	Long term
United Kingdom	●	0.099	◑	0.067	◑	0.064	Sustainable finance model 2.0.	I = F + S + E	Medium term
Estonia	●	0.098	◑	0.067	◕	0.091	Sustainable finance model 2.0.	I = F + S + E	Medium term
Lithuania	◕	0.095	○	0.062	○	0.000	Conventional finance	F	Short term
Germany	◕	0.094	◑	0.067	◑	0.069	Sustainable finance model 2.0.	I = F + S + E	Medium term
France	◑	0.089	◕	0.068	◔	0.055	Sustainable finance model 1.0.	F > S and E	Short term
Spain	◔	0.086	◔	0.065	○	0.021	Conventional finance	F	Short term
Austria	◔	0.085	◑	0.067	◑	0.078	Sustainable finance model 2.0.	I = F + S + E	Medium term
Latvia	◔	0.085	◔	0.065	◔	0.049	Sustainable finance model 1.0.	F > S and E	Short term
Poland	◔	0.083	◔	0.065	○	0.028	Sustainable finance model 1.0.	F > S and E	Short term
Portugal	◔	0.083	◔	0.065	○	0.024	Sustainable finance model 1.0.	F > S and E	Short term
Italy	○	0.077	◔	0.064	◔	0.040	Sustainable finance model 1.0.	F > S and E	Short term

is visible. Table 9 shows the results of the comparative analysis.

The comparative analysis shows a clear trend – the more favorable the FinTech PEST environment in a country, the better the achievement of SDGs, the better results of Sustainable Finance indicators, and therefore, the higher the Sustainable Finance typology assigned to the country. Finland, Denmark, Sweden, and the Netherlands ranked first in the FinTech PEST environment, showed great results in the implementation of SDGs and finance, and all four were assigned to the Sustainable Finance 3.0 – all four are oriented to social-environmental impact first and a common good value in the long run. Moreover, such a trend is seen in the assessment of all 15 countries – the less favorable the PEST environment for FinTech development, the lower the achievement of SDGs, the worse the Sustainable Finance performance of a country. The only exception is two countries – Lithuania and Spain, that were assigned to the Conventional Finance model, or "Finance-as-usual", oriented to the maximization of finan-

cial value in a short-term, taking average positions in the FinTech PEST environment ranking despite poor performance in the achievement of SDGs and the sustainable financing. The link between the Sustainable Finance model, SDGs, and PEST conditions for the sustainable development of the FinTech industry was visualized and presented in Figure 3.

The paper suggests a novel approach of sustainability in the development of FinTech industry, finance, and achievement of SDGs, as a circular process of three interacting factors and invites for the discussion.

4. DISCUSSION

The findings of this study show that 4 out of 17 SDGs have a statistical connection with the FinTech PEST environment (listed in descending order of the link): SDG16, SDG8, SDG9, and SDG4. This result can be interpreted in two ways: either improving the FinTech PEST environment enhances the achievement of SDGs, or
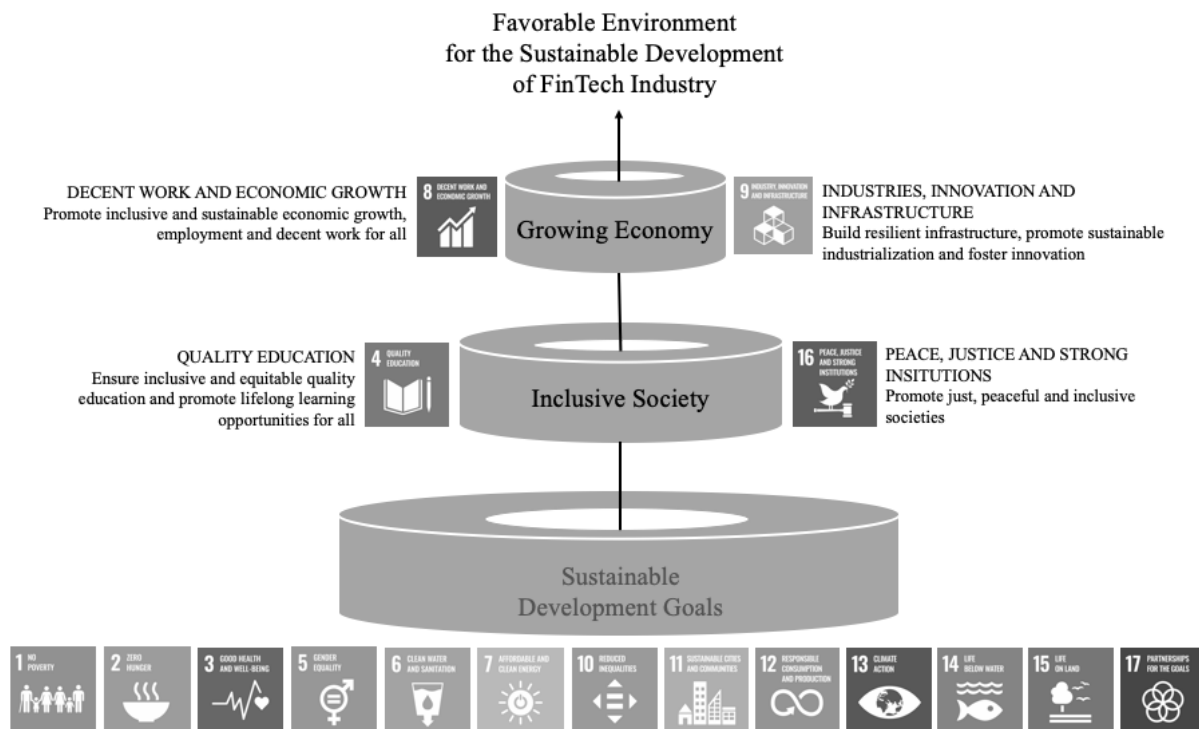
Figure 3. Link between Sustainable Finance model, SDGs, and PEST environment for the sustainable development of FinTech industry

vice versa – the achievement of SDGs improves the FinTech PEST environment. Both modes of interpretation may likely be acceptable. However, the paper presents the interpretation of the results as follows. The goals, targets, and indicators of SDG16, SDG4, SDG8, and SDG9, relevant to FinTech development, presented in Appendix C, contribute to the formation of a favorable environment and are conducive to the sustainable development of the FinTech industry in a country. Therefore, it can be stated, that the study results lead to priority SDGs in terms of FinTech, thus filling the research gap.

The results of the study can be used as a part of policy decision-making methodologies and should be taken into-account when considering how to improve the political and/or economic and/or social and/or technological environment to facilitate the development of sustainable FinTech. The findings of this study not only show the strengths and weaknesses of 15 states in terms of the FinTech environment but also points out which SDG achievement could im-

prove the favorableness of the PEST environment for the development of sustainable FinTech in a country.

This study was limited by the temporal equivalence of the data. International ranking data for 2020 was used to assess the FinTech PEST environment. In compiling these rankings, the data from different time intervals were used, which generally partially cover the years 2016–2020. Meanwhile for SDG achievement assessment, the data generally partially covering the years 2010–2020 were used. Therefore, SDG achievement data from 2016 were used (Ziolo et al., 2021). Some limitations were observed in the comparative analysis as well – Lithuania and Spain as representatives of the Conventional Finance model took average positions in the FinTech PEST environment ranking despite poor performance in the achievement of SDGs and the Sustainable Finance, therefore, stood out as the only countries that did not follow the general trend of the results. Therefore, the results call for further research.

CONCLUSION

FinTech becomes central to the achievement of Sustainable Development Goals. Thus, it is crucial to study the interrelationships and implications of these two processes as well as assess external conditions for FinTech on national level to facilitate further proper policy-making and public finance. By assessing FinTech political, economic, social, and technological environments of 15 countries as separate environments, this study established that the most favorable political and economic environments for FinTech sector development are in Northern Europe, including the Baltic States, whereas the most favorable social and technological environments, as well as the overall FinTech PEST environment, are in the Northern and Western Europe. The findings of the correlation analysis between the overall FinTech PEST environment and SDGs confirmed a statistical link between FinTech PEST environment and SDG4, SDG8, SDG9, and SDG16, where the correlation coefficient was greater than 0.5 for all three (Pearson, Spearman, Kendall) correlation measurement methods. This suggests that FinTech PEST environment and SDG4, SDG8, SDG9, SDG16 are dependent, and the greatest dependence of the scores is between FinTech PEST environment and SDG16. The findings of the comparative analysis of the overall FinTech PEST environment, SDGs, and Sustainable Finance model scores of 15 countries demonstrate a clear trend: the more favorable the FinTech PEST environment in a country, the better the achievement of SDGs, the better results of Sustainable Finance indicators and therefore, and the higher the Sustainable Finance typology assigned to the country. Thus, it is suggested that it is a circular process of inseparable interacting factors, therefore policymakers and other stakeholders on a country level should look at it as a process while forming government and financial regulations, as well as administration of the state and municipal financial entities.

Further studies should be extended by assessing the FinTech PEST environment and implementation of SDGs in more countries since the achievement of SDGs is a common goal of 193 countries (current study represents the results for 15 countries), as well as clarifying the link between the FinTech PEST environment, SDGs and the Sustainable Finance model to facilitate proper policy-making and public finances and further shape favorable environment for the sustainable development of FinTech industry.

AUTHOR CONTRIBUTIONS

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APPENDIX A

Table A1. Assessment tool for FinTech sector environment based on PEST analysis of FinTech sector external environmental indicators

Source: Pauliukevičienė and Stankevičienė (2021).

Environ.	Indicator	Explanation of the indicator
Political	Access to finance (P1)	Advantages and efficiency of credit reporting systems and bankruptcy laws in lending promotion (World Bank Group, 2020)
	Governance efficiency (P2)	Results of core state areas and investments, the provision of a framework for sustained and sustainable wealth generation (SolAbility, 2020)
	Government size (P3)	Government spending, tax burden, fiscal health (Miller et al., 2020)
	Openness to business (P4)	Levels of bureaucracy and corruption, manufacturing costs, favorability of tax environment, and transparency of government practices (U.S. News, 2020)
	Open Markets (P5)	Freedom of trade, investment and finance (Miller et al., 2020)
	Political globalization (P6)	Number of international embassies, missions, NGOs and other organizations, treaties, and investment partners (Dreher, 2006; Gygli et al., 2019; KOF Swiss Economic Institute, 2020)
	Regulation environment for starting a business (P7)	Costs, time, procedures, and paid-in minimum capital requirement for a SME to start up and formally function in the largest business city of the economy (World Bank Group, 2020)
	Rule of law (P8)	Property rights, government integrity, judicial effectiveness (Miller et al., 2020)
Economic	Competitiveness and attractiveness of the country as a Fintech Nation (E1)	Fintech activity and the development of local fintech ecosystem (Findexable, 2019)
	Attractiveness and competitiveness of the leading city as a Fintech City (E2)	Quantity and quality of companies in an ecosystem, business environment of the location (Findexable, 2019)
	Economic globalization (E3)	Level of financial and trade globalization (Dreher, 2006; Gygli et al., 2019; KOF Swiss Economic Institute, 2020)
	Inflation rate (E4)	Annual percent change, average consumer prices (International Monetary Fund, 2021)
	GDP per capita (E5)	Purchasing power parity, current prices, international dollars per capita (International Monetary Fund, 2021)
	Natural capital (E6)	Present natural environment, including presence of resources, and the depletion level of those resources (SolAbility, 2020)
	Real GDP growth (E7)	Annual percent change (International Monetary Fund, 2021)
	Resource efficiency and intensity (E8)	Effective use of available resources as an assessment of operational competitiveness in a resource-constraint world (SolAbility, 2020)

Table A1 (cont.). Assessment tool for FinTech sector environment based on PEST analysis of FinTech sector external environmental indicators

Environ.	Indicator	Explanation of the indicator
Social	Entrepreneurship (S1)	Level of entrepreneurship (U.S. News, 2020)
	Intellectual capital and innovation (S2)	Possibilities to generate new job places and wealth using innovation and value-added industries in the globalized markets (SolAbility, 2020)
	Population (S3)	Millions of people as a potentially sufficient customer base/market for the development of the sector (International Monetary Fund, 2021)
	Progress of human development (S4)	Life expectancy and health, human knowledge, standard of living (Conceicao, 2020)
	Social capital (S5)	Equality, security, freedom, and level of life satisfaction in a country (SolAbility, 2020)
	Social globalization (S6)	Level of interpersonal, informational, and cultural globalization (Dreher, 2006; Gygli et al., 2019; KOF Swiss Economic Institute, 2020)
	Talent availability (S7)	Amount of skilled workforce and its' sustainability based on emerging and aging workforce trends (Talent Solutions, 2020)
	Quality of life (S8)	Quality of life: income equality, political stability, development of state education and health systems, affordability, economic stability, family-friendliness, labor market security, (U.S. News, 2020)
Technological	Digitalization (T1)	Progression of the digital economy (Chakravorti et al., 2020).
	E-Participation (T2)	Citizenry access to information and public services (United Nations, 2020)
	Internet speed (T3)	Fixed broadband and mobile speed, Mbps (Speedtest, 2020)
	National cybersecurity (T4)	Level of cybersecurity, preparedness to prevent and fight cyber-attacks and crimes (NCSI, 2020)
	Network readiness (T5)	Application and impact of ICT in the economy (Portulans Institute, 2020)
	Online service (T6)	Scope and quality of online services (United Nations, 2020)
	Research and development (T7)	Scientists, international R&D companies, gross expenditure on R&D, QS university ranking (Dutta et al., 2020)
	Telecommunication infrastructure (T8)	Users and subscribers of the internet, mobile, mobile broadband, fixed broadband (United Nations, 2020)

APPENDIX B

Table B1. Normalized values of FinTech PEST environment indicators and their significance

Source: Pauliukevičienė and Stankevičienė (2021).

Political environment	P1	P2	P3	P4	P5	P6	P7	P8
Austria	0.077	0.097	0.053	0.101	0.094	0.091	0.049	0.097
Denmark	0.114	0.099	0.056	0.120	0.100	0.089	0.113	0.100
Estonia	0.114	0.105	0.271	0.081	0.096	0.067	0.137	0.094
Finland	0.088	0.093	0.082	0.111	0.098	0.091	0.124	0.101
France	0.069	0.083	0.011	0.076	0.086	0.095	0.119	0.090
Germany	0.114	0.103	0.130	0.097	0.089	0.094	0.051	0.090
Italy	0.057	0.086	0.045	0.064	0.078	0.094	0.072	0.082
Latvia	0.141	0.103	0.252	0.054	0.088	0.065	0.128	0.094
Lithuania	0.114	0.092	0.347	0.069	0.085	0.067	0.122	0.088
Netherlands	0.057	0.090	0.133	0.116	0.100	0.093	0.130	0.096
Poland	0.123	0.102	0.204	0.071	0.090	0.084	0.048	0.074
Portugal	0.057	0.099	0.106	0.088	0.078	0.090	0.099	0.086
Spain	0.088	0.087	0.101	0.078	0.094	0.086	0.073	0.086
Sweden	0.088	0.061	0.072	0.114	0.098	0.092	0.118	0.098
United Kingdom	0.123	0.091	0.141	0.080	0.095	0.093	0.134	0.095
Significance of the indicator	0.110	0.126	0.101	0.194	0.138	0.063	0.180	0.098
Economic environment	E1	E2	E3	E4	E5	E6	E7	E8
Austria	0.076	0.063	0.096	0.077	0.098	0.116	0.088	0.059
Denmark	0.086	0.082	0.098	0.100	0.099	0.119	0.152	0.129
Estonia	0.105	0.089	0.099	0.104	0.084	0.177	0.126	0.063

Table B1 (cont.). Normalized values of FinTech PEST environment indicators and their significance

Political environment	P1	P2	P3	P4	P5	P6	P7	P8
Finland	0.097	0.078	0.097	0.091	0.094	0.161	0.162	0.097
France	0.093	0.110	0.090	0.098	0.092	0.105	0.043	0.106
Germany	0.103	0.114	0.091	0.097	0.096	0.023	0.104	0.082
Italy	0.078	0.087	0.080	0.105	0.087	0.050	0.036	0.091
Latvia	0.030	0.052	0.092	0.092	0.080	0.172	0.103	0.123
Lithuania	0.116	0.100	0.090	0.075	0.086	0.149	0.200	0.124
Netherlands	0.112	0.103	0.103	0.076	0.099	0.025	0.123	0.056
Poland	0.068	0.088	0.082	0.042	0.082	0.068	0.169	0.028
Portugal	0.070	0.067	0.091	0.106	0.082	0.087	0.040	0.075
Spain	0.099	0.097	0.087	0.111	0.084	0.077	0.021	0.077
Sweden	0.110	0.096	0.097	0.086	0.095	0.175	0.144	0.127
United Kingdom	0.120	0.119	0.093	0.086	0.091	0.018	0.042	0.130
Significance of the indicator	0.171	0.151	0.143	0.110	0.136	0.085	0.091	0.113
Social environment	S1	S2	S3	S4	S5	S6	S7	S8
Austria	0.088	0.091	0.067	0.092	0.099	0.098	0.070	0.094
Denmark	0.093	0.099	0.056	0.096	0.094	0.096	0.119	0.107
Estonia	0.052	0.088	0.028	0.086	0.096	0.090	0.110	0.042
Finland	0.090	0.096	0.055	0.096	0.100	0.094	0.105	0.097
France	0.091	0.091	0.115	0.088	0.089	0.093	0.065	0.086
Germany	0.113	0.093	0.117	0.098	0.091	0.099	0.107	0.095
Italy	0.083	0.080	0.115	0.086	0.083	0.080	0.051	0.079
Latvia	0.039	0.078	0.032	0.082	0.079	0.081	0.093	0.036
Lithuania	0.041	0.076	0.038	0.083	0.075	0.091	0.068	0.039
Netherlands	0.099	0.092	0.085	0.097	0.095	0.093	0.123	0.101
Poland	0.074	0.090	0.104	0.083	0.083	0.070	0.049	0.077
Portugal	0.074	0.087	0.072	0.081	0.093	0.082	0.100	0.085
Spain	0.082	0.074	0.110	0.088	0.092	0.086	0.089	0.083
Sweden	0.104	0.100	0.073	0.098	0.100	0.100	0.121	0.106
United Kingdom	0.108	0.098	0.116	0.095	0.078	0.102	0.124	0.092
Significance of the indicator	0.136	0.156	0.081	0.116	0.104	0.079	0.195	0.133
Technological environment	T1	T2	T3	T4	T5	T6	T7	T8
Austria	0.091	0.102	0.087	0.085	0.090	0.092	0.090	0.086
Denmark	0.112	0.099	0.103	0.094	0.102	0.099	0.097	0.103
Estonia	0.092	0.105	0.085	0.100	0.086	0.098	0.070	0.098
Finland	0.113	0.098	0.092	0.096	0.099	0.098	0.096	0.096
France	0.086	0.094	0.098	0.096	0.091	0.090	0.094	0.092
Germany	0.095	0.072	0.090	0.093	0.097	0.087	0.098	0.093
Italy	0.066	0.083	0.080	0.089	0.079	0.081	0.085	0.080
Latvia	0.075	0.055	0.079	0.087	0.075	0.074	0.062	0.089
Lithuania	0.082	0.071	0.090	0.099	0.081	0.089	0.068	0.087
Netherlands	0.109	0.101	0.099	0.093	0.101	0.095	0.095	0.100
Poland	0.074	0.100	0.085	0.098	0.078	0.087	0.075	0.082
Portugal	0.076	0.082	0.086	0.086	0.080	0.082	0.083	0.081
Spain	0.079	0.085	0.096	0.098	0.084	0.091	0.086	0.090
Sweden	0.107	0.082	0.100	0.074	0.103	0.097	0.099	0.101
United Kingdom	0.101	0.102	0.084	0.090	0.096	0.096	0.096	0.097
Significance of the indicator	0.173	0.083	0.136	0.144	0.115	0.086	0.114	0.150

APPENDIX C

Table C1. Goals, targets, and indicators of SDG16, SDG4, SDG8, SDG9, presented in order of SDGs statistical link strength with the FinTech PEST environment

SDG	Goal	Targets	Indicators
16. Peace, Justice, and Strong Institutions	Promote just, peaceful and inclusive societies	16.4. By 2030, significantly reduce illicit financial and arms flows, strengthen the recovery and return of stolen assets, and combat all forms of organized crime	16.4.1. Total value of inward and outward illicit financial flows (in current United States dollars)
			16.4.2. Proportion of seized, found, or surrendered arms whose illicit origin or context has been traced or established by a competent authority in line with international instruments
		16.5. Substantially reduce corruption and bribery in all their forms	16.5.1. Proportion of persons who had at least one contact with a public official and who paid a bribe to a public official, or were asked for a bribe by those public officials, during the previous 12 months
			16.5.2. Proportion of businesses that had at least one contact with a public official and that paid a bribe to a public official, or were asked for a bribe by those public officials during the previous 12 months
		16.6 Develop effective, accountable and transparent institutions at all levels	16.6.1. Primary government expenditures as a proportion of original approved budget, by sector (or by budget codes or similar)
			16.6.2. Proportion of the population satisfied with their last experience of public services
		16.7 Ensure responsive, inclusive, participatory and representative decision-making at all levels	16.7.1. Proportions of positions (by sex, age, persons with disabilities and population groups) in public institutions (national and local legislatures, public service, and judiciary) compared to national distributions
			16.7.2. Proportion of population who believe decision-making is inclusive and responsive, by sex, age, disability and population group
		16.10 Ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements	16.10.2. Number of countries that adopt and implement constitutional, statutory and/or policy guarantees for public access to information
8. Decent Work and Economic Growth	Promote inclusive and sustainable economic growth, employment and decent work for all	8.1 Sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries	8.1.1. Annual growth rate of real GDP per capita
		8.2 Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labor-intensive sectors	8.2.1. Annual growth rate of real GDP per employed person
		8.3 Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services	8.3.1. Proportion of informal employment in nonagriculture employment, by sex
		8.10 Strengthen the capacity of domestic financial institutions to encourage and expand access to banking, insurance and financial services for all	8.10.1. Number of commercial bank branches and automated teller machines (ATMs) per 100,000 adults
			8.10.2. Proportion of adults (15 years and older) with an account at a bank or other financial institution or with a mobile-money-service provider

Table C1 (cont.). Goals, targets, and indicators of SDG16, SDG4, SDG8, SDG9, presented in order of SDGs statistical link strength with the FinTech PEST environment

SDG	Goal	Targets	Indicators
9. Industries, Innovation and Infrastructure	Build resilient infrastructure, promote sustainable industrialization and foster innovation	9.3 Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets	9.3.1. Proportion of small-scale industries in total industry value added
			9.3.2. Proportion of small-scale industries with a loan or line of credit
		9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending	9.5.1. Research and development expenditure as a proportion of GDP
			9.5.2. Researchers (in full-time equivalent) per million inhabitants
		9.B Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities	9.b.1. Proportion of medium and high-tech industry value added in total value added
		9.C Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020	9.c.1. Proportion of population covered by a mobile network, by technology
4. Quality Education	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship	4.4.1. Proportion of youth and adults with information and communications technology (ICT) skills, by type of skill
		4.B By 2020, substantially expand globally the number of scholarships available to developing countries, in particular least developed countries, small island developing States and African countries, for enrolment in higher education, including vocational training and information and communications technology, technical, engineering and scientific programmes, in developed countries and other developing countries	4.b.1. Volume of official development assistance flows for scholarships by sector and type of study