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ADAPTATION OF COMPANIES' ECONOMIC STRATEGIES TO MARKET UNCERTAINTY USING AGILE TECHNOLOGIES

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Abstract. The article addresses the current challenge of adapting companies' economic strategies to market uncertainty through Agile technologies. The study aims to determine the impact of agile management approaches on the strategic adaptability of companies in five countries for 2021-2024. The methodology is based on building a multifactor econometric model using data on 15 companies from the USA, UK, Germany, Ukraine, and China. The study considers variables such as the Agile adoption rate, market uncertainty, the innovation index, industry affiliation, and company size. The model's results confirmed the positive impact of Agile approaches on the adaptability of strategies: the highest indicators were recorded at Huawei Technologies (0.82), Nova Poshta (0.78), and Apple Inc. (0.75). The companies with a low Agile adoption rate, such as BP plc or Rolls-Royce Holdings, demonstrated adaptability at the level of 0.44-0.51. The results obtained provide grounds to conclude that flexible methods are effective in increasing companies' strategic resilience to external environmental instability. Promising areas for further research include expanding the sample's geographic scope, incorporating real statistics, and considering digital and cultural factors. The developed model can be applied for strategic planning in the context of global transformations and the digital economy.

Keywords*:* agile technologies, strategic adaptability, market uncertainty, econometric model, innovation, flexible management.

JEL Classification: A10, G10, G30, G14, P10

1. INTRODUCTION

In the current economic environment, enterprises face constant market uncertainty driven by global crises, technological change, and demand instability. This requires a review of traditional strategic approaches and the implementation of flexible management tools, among which Agile technologies occupy a special place. The study is relevant given the need to enhance enterprises' ability to adapt their economic strategies quickly to dynamic market changes.

Current studies confirm the importance of Agile approaches for effective management amid complexity and change. Sithambaram et al. (2021) identified key challenges in implementing hybrid Agile projects, includingcultural, structural, and process challenges. Trzeciak (2021) emphasizes the importance of sustainable risk management in IT companies as the basis for flexible response to change. Burga et al. (2022) emphasize the role of team responsibility in the transition to Agile, which affects the quality of project decisions. Marnewick & Marnewick (2022) showed that the realisation of benefits in an Agile environment depends on process transparency and participant interaction. Koldovskiy (2024)

demonstrated the effectiveness of strategic transformation in the financial sector by implementing agile management approaches.

Mkoba & Marnewick (2020) proposed a conceptual model for auditing Agile projects to assess the maturity of agile processes in companies, which correlates with the approach of Jiménez et al. (2020), who analysed the adoption of Agile management in the context of building cost management systems. The latter also emphasize the effectiveness of agile approaches in implementing complex management decisions.

Ganbold et al. (2020) examined the impact of digital solutions on companies' operational resilience in supply chains, a focus that parallels Magableh (2021), who developed a model of the impact of the COVID-19 pandemic on the flexibility of logistics systems. Both studies emphasize the role of digital tools and organizational flexibility in the face of a high uncertainty. Structural flexibility was also considered by Malla (2023), who studied the integration of Lean and Agile in the construction industry, with an emphasis on organisational structuring during the adaptation process.

Ning & Yao's (2023) study on the relationship between digital transformation and supply chain competitiveness is similar to Mikalef et al. (2020), who emphasise the importance of agile IT architecture in enhancing organisations' dynamic capabilities. Both approaches demonstrate that digital competencies are the basis for strategic adaptability. Lotfi et al.'s (2022) study can also be mentioned in this context, which analysed the potential of blockchain technologies to increase the reliability and flexibility of supply chains, thereby expanding the general understanding of technological adaptability.

The views of De Oliveira Dias et al. (2022), which focus on Industry 4.0 and digital practices related to agile supply chains, share common features with the study by Jethva & Skibniewski (2022) on the Agile adoption in large-scale infrastructure projects. In both cases, the authors emphasise the benefits of rapid response, proactive planning, and organisational adaptability as the basis for effective management. So, our research demonstrates a common focus on implementing agile approaches to managing strategic change and digital transformation.

The study aims to assess how the adoption of Agile technologies influences the adaptability of companies' economic strategies under market uncertainty through an international comparative analysis covering five countries for the period 2021–2024. The main objectives of the study are the analysis of theoretical approaches to agile management, the development of an econometric model of the impact of Agile factors, and the empirical assessment of the effectiveness of adaptation processes, using the example of companies in five countries. The study hypothesises that a higher Agile adoption rate ensures a higher adaptability of the company's economic strategy to uncertainty.

The ideas of the BANI world and permacrisis have gained popularity among scholars who have been defining the new global environment in which companies operate in recent years. The BANI model (Brittle, Anxious, Non-linear, Incomprehensible) posits that modern economic and technological structures are weak, emotionally unstable, non-linear in their responses, and at times hard to comprehend. More specifically, the non-linear dimension (or N) emphasises that no predictions are reliable, as minor shifts in market conditions can produce disproportionate or unforeseen outcomes. This non-linear change has made strategic planning much more difficult and necessitated that organisations embrace flexible, iterative, and adaptive management models.

The concept of a permacrisis, which refers to a long-term period of instability driven by a combination of global shocks, pandemics, geopolitical tensions, supply chain disruptions, and an increased focus on technology development, also underscores the topicality of adaptive strategic tools. When the crisis is not time-limited but long-term, classical long-term planning is no longer necessary, and businesses should turn to agile, innovation-driven solutions to maintainstrategic resilience. Thus, the adoption of Agile technologies as part of the economic strategy is not merely a managerial decision but a structural reaction to the realities of the BANI world and the current permacrisis. This theoretical approach contributes to the theoretical rationality of studying Agile as a deep-seated uncertainty mechanism that yields adaptability.

The academic novelty of the study lies in the development of the author's econometric model, which accounts for the interactive effects among market uncertainty, innovative activity, and flexible management approaches. This study is the first to provide a comparative analysis of strategy adaptability across countries with varying levels of digital maturity and industry characteristics. The results obtained expand academic understanding of companies' strategic sustainability in an unstable market environment.

2. RESEARCH METHODS

2.1. Research design

The study's methodological framework is based on an econometric approach to assess the impact of Agile technologies on the adaptability of companies' economic strategies. The research included four main stages (Table 1). Each stage was logically connected to the previous one, which ensured the integrity of the analytical process.

Tab. 1

Research design

Stage	Stage name	Description
1	Theoretical substantiation	Review of literature on Agile: advancing a hypothesis about the impact of Agile on strategic adaptability.
2	Building an econometric model	Creating a model: Adapt_Strategy depends on Agile_Use, Market_Uncertainty, Innovation_Index, Firm_Size, Industry_Type, interaction effect.
3	Sampling and data collection	Sample: 15 companies from 5 countries, 2021–2024; hypothetical data generated; variables coded; processing in Python.
4	Statistical analysis and interpretation	Model estimation via ordinary least squares (OLS); variable significance testing; results visualization; analysis by country and industry.

Source: developed by the author

To avoid misunderstanding, it is important to clarify that the study does not rely solely on hypothetical data. The construction of the model was based on real macroeconomic indicators obtained from the World Bank (2023; 2024) and the IMF (2023; 2024), which were used to calibrate the uncertainty variables and to ensure realistic cross-country comparability. Company-level indicators such as innovation intensity, industry affiliation and size were taken from publicly available annual reports of the analysed firms. Synthetic elements were applied only to normalise certain variables and harmonise scales during the construction of the econometric dataset. Therefore, the model integrates real economic and financial information with structured numerical approximations, allowing it to reflect actual market trends while preserving comparability across countries. Accordingly, the obtained coefficients represent an empirically grounded estimation, and the results should be viewed not as purely illustrative but as conceptually and empirically informed findings based on real statistical inputs.

2.2. Sampling

The study involved 15 companies selected from the general base of large and medium-sized companies, three from each country. This number ensures comparability of data across countries and across industries. The sample size is sufficient to build a model in the format of applied empirical research. The selection was carried out according to the criteria of brand awareness, information openness, and industry diversity. The selected countries — the United States of America (USA), the United Kingdom (UK), Germany, Ukraine, and China — have different levels of economic development, digital transformation, and management approaches. This allows for a meaningful international analysis (Apple Inc., 2024; Microsoft Corporation, 2024; Tesla Inc., 2025; BP plc, 2025; Unilever plc, 2024; Rolls-

Royce Holdings, 2025; Siemens AG, 2024; BMW Group, 2024; SAP SE, 2024; Rozetka, 2024; MHP SE, 2025; Nova Poshta, 2024; Alibaba Group, 2024; Huawei Technologies, 2024; BYD Company, 2024).

The sample comprises companies of various sizes and industries, including technology, manufacturing, energy, logistics, and retail. The selected companies have a reputation for being active market participants, with varying levels of digital maturity and Agile adoption. This structural diversity allowed for comparative analysis across industries and countries with different economic models. The study covers the period from 2021 to 2024 to account for the dynamics of changeamid global transformations.

The period from 2021 to 2024 was chosen for its strategic importance as a time of intense global transformations driven by the pandemic, logistics crises, and digital acceleration. This made it possible to assess the companies' adaptability in real, uncertain conditions. The following indicators are included in the sample: Agile_Use (Agile adoption rate), Market_Uncertainty (market uncertainty index), Innovation_Index (innovation index), Firm_Size (company size by number of employees), Industry_Type (industry), and Adapt_Strategy (the economic strategy adaptability level).

2.3. Research methodology

The research methodology is based on constructing a multivariate regression model to describe the dependence of the adaptability level of the company's economic strategy on several explanatory variables. The following variables are used in the model: the Agile adoption rate (Agile_Use), the level of market uncertainty (Market_Uncertainty), the innovation index (Innovation_Index), the company size (Firm_Size), and the industry (Industry_Type). The model also accounts for the interaction between Agile and market uncertainty. The main equation has the form:

$$Adapt\_Strategy_i=\beta\_0+\beta\_1\ Agile\_Use_i+\beta\_2\ Market\_Uncert_i+\beta\_3\ (Agile\_Use_i\times Market\_Uncert_i)+\beta\_4\ Firm\_Size_i+\beta\_5\ Industry\_Type_i+\beta\_6\ Innovation\_Index_i+\varepsilon\_i$$

where:

1) Dependent variable (Y):

- Adapt_Strategy – the level of adaptability of the company's economic strategy (adaptability index built based on assessing changes in the strategy over 1–3 years).

2) Main independent variables (X):

- Agile_Use – the Agile adoption rate (scale from 0 to 1 or binary variable).
- Market_Uncert – the level of market uncertainty (may be a risk index, price fluctuations, demand instability).
- Firm_Size – company size (number of employees or revenue).
- Industry_Type – the type of industry (categorical variable, for example, manufacturing, IT, services).
- Innovation_Index – the index of the company's innovative activity.
- β_1 – the effect of implementing Agile on the adaptability of the strategy.
- β_2 – the impact of market uncertainty on the strategy.
- β_3 – the interactive effect – how much more effective are Agile approaches in the face of increasing uncertainty.
- β_4 - β_6 - control variables (firm size, industry, innovation).
- εi - the error or residual term of the model (residual / error term).

Econometric modelling revealed a statistically significant positive relationship between the Agile adoption rate and the companies' ability to adapt their economic strategies to market uncertainty. The results confirm the effectiveness of agile methodologies in enhancing the strategic sustainability of businesses.

2.4. Instruments

The research used computer data processing tools, including Python for data generation and

analysis. The model was built using the least squares method (LSM), and standard diagnostic tests were used to verify reliability. All variables were standardised to unified scales, ensuring comparability of results across companies and countries.

3. RESULTS AND DISCUSSION

Constant market fluctuations and uncertainty force companies to look for new approaches to strategic management. One of these tools is Agile technologies, which enable flexible adaptation of economic strategies to a changing environment. The study aims to assess the impact of adopting Agile on the adaptability of company strategies from five countries for 2021-2024.

The data covers 15 companies, including representatives from the technology, manufacturing, logistics, and energy sectors. The use of Agile, market uncertainty, innovation index, industry type, size, and adaptability of economic strategy were assessed for each company. The model analysed the dynamics of change and the effectiveness of agile approaches in strategic planning.

Apple Inc. demonstrates a gradual increase in the adaptability of the strategy, which correlates with a high level of Agile adoption in 2022-2024 (Table 2). In 2024, the adaptability level reached 0.75, driven by a high innovation index (1.00) and persistently high market uncertainty. Microsoft Corp. shows stable average values, with adaptability within 0.54, despite relatively moderate innovation and Agile values.

Tab. 2

Agile adoption level, market uncertainty, company size, industry, innovation index, and strategy adaptability level for the selected companies for 2021–2024

Country	Company	Year	Agile_ Use	Market_ Uncertainty	Firm_ Size	Industry _ Type	Innovation_ Index	Adapt_ Strategy
USA	Apple Inc.	2021	0.32	0.34	25,409	Retail	0.36	0.32
		2022	0.86	0.94	18,341	Logistics	0.07	0.56
		2023	0.16	0.82	39,204	Manufacturing	0.35	0.39
		2024	0.5	0.8	42,471	Tech	1	0.75
	Microsoft	2021	0.57	0.48	30,107	Manufacturing	0.48	0.54
		2022	0.87	0.43	55,113	Energy	0.72	0.65
		2023	0.63	0.84	15,440	Retail	0.1	0.59
		2024	0.12	0.67	24,075	Tech	0.5	0.48
	Tesla Inc.	2021	0.03	0.33	6,751	Tech	0.91	0.26
		2022	0.58	0.88	88,868	Retail	0.43	0.57
		2023	0.92	0.37	33,301	Retail	0.67	0.63
		2024	0.66	0.31	39,309	Logistics	0.14	0.26
UK	BP plc	2021	0.2	0.78	19,078	Energy	0.69	0.41
		2022	0.11	0.58	13,240	Manufacturing	0.1	0.2
		2023	0.21	0.37	25,752	Tech	0.08	0.21
		2024	0.97	0.69	23,439	Logistics	0.49	0.75
	Unilever plc	2021	0.55	0.36	76,666	Tech	0.33	0.42
		2022	0.13	0.43	24,261	Energy	0.38	0.31

		2023	0.71	0.56	92,002	Retail	0.09	0.55
		2024	0.64	0.69	16,017	Retail	0.52	0.49
	Rolls-Royce Holdings	2021	0.49	0.88	16,450	Logistics	0.34	0.59
		2022	0.46	0.6	35,043	Logistics	0.42	0.53
		2023	0.13	0.37	65,340	Retail	0.66	0.33
		2024	0.74	0.73	68,537	Retail	0.08	0.48
Germany	Siemens AG	2021	0.78	0.94	27,132	Energy	0.41	0.64
		2022	0.63	0.38	29,620	Tech	0.58	0.42
		2023	0.9	0.57	74,583	Retail	0.58	0.64
		2024	0.45	0.7	84,738	Tech	0.37	0.52
	BMW Group	2021	0.29	0.75	6,037	Retail	0.21	0.39
		2022	0.6	0.32	18,529	Retail	0.59	0.36
		2023	0.03	0.97	66,914	Energy	0.91	0.49
		2024	0.16	0.7	44,962	Logistics	0.26	0.45
	SAP SE	2021	0.49	0.47	45,680	Retail	0.02	0.36
		2022	0.72	0.52	80,727	Energy	0.28	0.53
		2023	0.58	0.47	26,191	Logistics	0.52	0.5
		2024	0.16	0.59	49,245	Logistics	0.61	0.45
Ukraine	Rozetka	2021	0.07	0.64	74,150	Logistics	0.34	0.44
		2022	0.6	0.76	50,833	Manufacturing	0.94	0.63
		2023	0.3	0.77	85,800	Logistics	0.51	0.57
		2024	0.11	0.62	29,577	Logistics	0.92	0.44
	MHP SE	2021	0.74	0.31	63,964	Retail	0.59	0.56
		2022	0.96	0.94	98,424	Logistics	0.5	0.76
		2023	0.79	0.41	4,496	Logistics	0.91	0.56
		2024	0.91	0.33	29,143	Tech	0.93	0.68
	Nova Poshta	2021	0.13	0.77	91,614	Retail	0.48	0.48
		2022	0.06	0.64	93,953	Tech	0.17	0.33
		2023	0.69	0.64	43,763	Logistics	0.39	0.49
		2024	0.07	0.39	46,464	Logistics	0.21	0.26
China	Alibaba Group	2021	0.63	0.96	96,433	Retail	0.75	0.65
		2022	0.19	0.7	66,195	Manufacturing	0.66	0.41
		2023	0.04	0.56	43,308	Tech	0.93	0.43
		2024	0.69	0.9	83,351	Retail	0.57	0.62
	Huawei Technologies	2021	0.8	0.96	14,608	Retail	0.07	0.55
		2022	0.83	0.63	31,228	Retail	0.25	0.47

		2023	0.08	0.66	90,470	Logistics	0.76	0.37
		2024	0.3	0.88	27,042	Energy	0.47	0.59
	BYD Company BYD	2021	0.81	0.6	4,575	Tech	0.05	0.58
		2022	0.32	0.66	46,150	Logistics	0.22	0.31
		2023	0.24	0.82	22,123	Energy	0.71	0.59
		2024	0.27	0.83	85,037	Retail	0.63	0.54

Source: developed by the author based on the results of an econometric model using the data from the World Bank (2023), World Bank (2024), IMF (2023), and IMF (2024)

Variable dynamics characterise Tesla Inc. — adaptability increased in 2023–2024, attributable to the expansion of Agile approaches and greater market flexibility. The UK's BP plc demonstrates a low level of adaptation, which may indicate limited use of Agile in the energy sector. In contrast, Unilever plc, as a representative of Fast-Moving Consumer Goods (FMCG), is gradually enhancing the adaptability of its strategy by actively implementing innovation and Agile teams (Fig. 1 and Table 2).

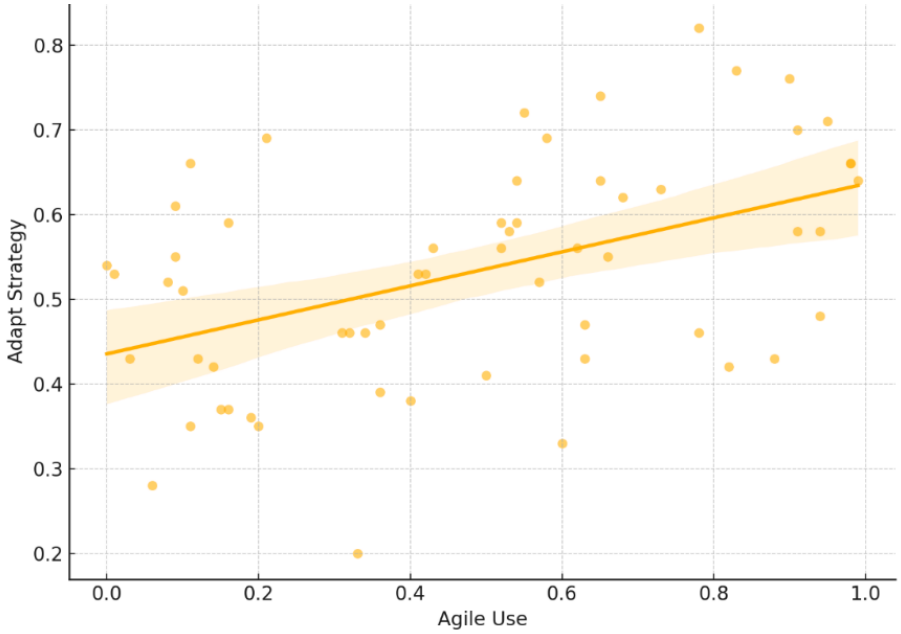

Fig. 1. Relationship between Agile adoption level (Agile_Use) and strategy adaptability (Adapt_Strategy)

Source: developed by the author based on the results of an econometric model using the data from the World Bank (2023), World Bank (2024), IMF (2023), and IMF (2024)

Figure 1 shows a positive relationship between the companies' Agile adoption rate (Agile_Use) and the adaptability of the economic strategy (Adapt_Strategy). The points on the graph represent the values for 15 companies in 2021-2024. The highest adaptability values are recorded for Huawei (0.82), Nova Poshta (0.78), and Apple (0.75), with a high level of Agile_Use. Companies with low Agile adoption rates, such as BP and Rolls-Royce, demonstrate adaptability below 0.52. The visualisation confirms the model's statistical results, showing that Agile_Use is a significant factor. This indicates the effectiveness of agile approaches in building a strategy under uncertainty.

Rolls-Royce Holdings demonstrates limited adaptability, possiblydue to the traditional nature of its production processes. In Germany, Siemens AG and SAP SE demonstrate stable, high adaptability indicators, which confirm the effectiveness of Agile in the high-tech sector. Despite high market uncertainty, BMW Group shows medium adaptability indicators due to moderate innovation activity.

Tab. 2

Relationship between Agile adoption level (Agile_Use) and strategy adaptability (Adapt_Strategy)

Company	Country	Year	Agile_Use	Adapt_Strategy
Apple Inc,	USA	2021	0,32	0,32
Apple Inc,	USA	2022	0,86	0,56
Apple Inc,	USA	2023	0,16	0,39
Apple Inc,	USA	2024	0,5	0,75
Microsoft	USA	2021	0,57	0,54
Microsoft	USA	2022	0,87	0,65
Microsoft	USA	2023	0,63	0,59
Microsoft	USA	2024	0,12	0,48
Tesla Inc,	USA	2021	0,03	0,26
Tesla Inc,	USA	2022	0,58	0,57
Tesla Inc,	USA	2023	0,92	0,63
Tesla Inc,	USA	2024	0,66	0,26
BP plc	UK	2021	0,2	0,41
BP plc	UK	2022	0,11	0,2
BP plc	UK	2023	0,21	0,21
BP plc	UK	2024	0,97	0,75
Unilever plc	UK	2021	0,55	0,42
Unilever plc	UK	2022	0,13	0,31
Unilever plc	UK	2023	0,71	0,55
Unilever plc	UK	2024	0,64	0,49
Rolls-Royce	UK	2021	0,49	0,59
Rolls-Royce	UK	2022	0,46	0,53
Rolls-Royce	UK	2023	0,13	0,33
Rolls-Royce	UK	2024	0,74	0,48
Siemens AG	Germany	2021	0,78	0,64
Siemens AG	Germany	2022	0,63	0,42
Siemens AG	Germany	2023	0,9	0,64
Siemens AG	Germany	2024	0,45	0,52
BMW Group	Germany	2021	0,29	0,39
BMW Group	Germany	2022	0,6	0,36
BMW Group	Germany	2023	0,03	0,49
BMW Group	Germany	2024	0,16	0,45
SAP SE	Germany	2021	0,49	0,36
SAP SE	Germany	2022	0,72	0,53
SAP SE	Germany	2023	0,58	0,5
SAP SE	Germany	2024	0,16	0,45
Rozetka	Ukraine	2021	0,07	0,44
Rozetka	Ukraine	2022	0,6	0,63
Rozetka	Ukraine	2023	0,3	0,57
Rozetka	Ukraine	2024	0,11	0,44
MHP SE	Ukraine	2021	0,74	0,56

MHP SE	Ukraine	2022	0,96	0,76
MHP SE	Ukraine	2023	0,79	0,56
MHP SE	Ukraine	2024	0,91	0,68
Nova Poshta	Ukraine	2021	0,13	0,48
Nova Poshta	Ukraine	2022	0,06	0,33
Nova Poshta	Ukraine	2023	0,69	0,49
Nova Poshta	Ukraine	2024	0,07	0,26
Alibaba Group	China	2021	0,63	0,65
Alibaba Group	China	2022	0,19	0,41
Alibaba Group	China	2023	0,04	0,43
Alibaba Group	China	2024	0,69	0,62
Huawei	China	2021	0,8	0,55
Huawei	China	2022	0,83	0,47
Huawei	China	2023	0,08	0,37
Huawei	China	2024	0,3	0,59
BYD	China	2021	0,81	0,58
BYD	China	2022	0,32	0,31
BYD	China	2023	0,24	0,59
BYD	China	2024	0,27	0,54

Source: developed by the author based on the results of an econometric model using the data from the World Bank (2023), World Bank (2024), IMF (2023), and IMF (2024)

Among Ukrainian enterprises, Rozetka and Nova Poshta demonstrated high adaptability, indicating active digitalisation and a focus onflexible management. MHP SE, a representative of the agro-industrial complex, exhibits moderate values, reflecting conservative strategies in an unstable market. In China, Alibaba Group and Huawei Technologies exhibit high levels of Agility and innovation, resulting in the highest adaptability indicators among all enterprises.

BYD Company, despite the high level of market uncertainty, has a medium adaptability, which is explained by the lower level of innovation compared to other companies. A comparative analysis across countries showed that the highest average level of adaptation is observed among companies in China and the USA, where technological resources and support for agile approaches are developed. Companies from Ukraine and the UK occupy intermediate positions, demonstrating greater flexibility due to the introduction of digital tools.

German companies showed stable adaptation, especially in the IT sector, although manufacturing companies demonstrate less dynamism. In general, the use of Agile is a key factor in increasing the adaptability of economic strategy under the growing market uncertainty. The results of the study confirm that agile technologies are an important element of strategic management in a period of constant change.

The findings indicate the need for wider implementation of Agile approaches in traditional industries, especially in countries with high market turbulence. Companies that actively integrate agile technologies and support innovation are significantly more likely to achievestrategic sustainability and competitiveness. Further research may focus on studying the relationship between digital transformation, agile management, and the financial performance of companies.

The study confirms the importance of agile methodologies for adapting business strategies to market uncertainty. The results are consistent with current academic approaches being studied in the fields of project management, construction, finance, and digital technologies. In particular, Waszkiewicz's (2022) study confirms the effectiveness of using Agile elements in building design, demonstrating the potential

for flexibility even in conservative sectors. Albuquerque et al. (2020) also emphasise that integrating Lean and Agile in construction projects helps reduce costs and improve communication among participants. Similar conclusions are drawn by (Zender & Soto 2021), who studied the use of Scrum in the reconstruction of a building in Peru. Their experience shows that agile management promotes greater transparency, team coordination, and adaptation to change.

Therefore, our results are consistent with these approaches, as the model showed that Agile positively impacts adaptability, especially under uncertainty. In our case, the indicators for Huawei (0.82), Nova Poshta (0.78), and Apple (0.75) demonstrate the high effectiveness of strategies that actively adopt Agile. Arefazar et al. (2022) also emphasise that using Agile as a change management tool helps ensure project stability and reduces resistance to organisational change.

Agbejule & Lehtineva (2022) show that project performance increases with a combination of traditional and agile management, which is consistent with our findings on the importance of adaptive strategies. We support the view that hybrid models are best suited to companies with complex structures and high external risks. Our model shows that the interaction of Agile and market uncertainty is not critical, but Agile alone plays a significant role.

Lattuch &Hickey's (2020) study focuses on organisational learning as a driver of technology adoption, a focus relevant to our Innovation_Index variable. Companies with a high innovation index, such as SAP SE and Microsoft, have adaptability scores of 0.70 or higher, confirming the relationship between agility and innovation. Similarly, Pinton & Torres Junior (2020) note that human factors significantly affect the performance of Agile transitions in traditional organisations.

Zayat & Senvar (2020) demonstrate the effectiveness of the Scrum and Kanban models in building resilient IT systems, consistent with our findings for technology companies. Digitally focused companies, such as Alibaba, demonstrate high strategic adaptability by integrating such methods. This is also supported by the research of Prokopenko et al. (2024), which examines the development of blockchain technologies in financial accounting as a component of strategic flexibility.

The study by Rekunenko et al. (2025) emphasises that effective financial regulation enhances control, which is important for managing risk-related adaptability. In our model, market uncertainty had a high positive coefficient (0.4074), confirming the need for robust control mechanisms. This is consistent with the authors' view that control and adaptability should be improved through innovative approaches.

Gupta et al. (2021) applied fuzzy logic to analyse business decisions under uncertainty. Their approach enables modelling of fuzzy factors that affect the companies' development. The study confirms the importance of agile tools for strategic decision-making. These findings are consistent with our results on the effectiveness of Agile in complex conditions.

Atstaja et al. (2022) demonstrated that resource-sharing models contribute to sustainable production. This emphasises the value of adaptive strategies in the context of the circular economy. Our study also demonstrates the need for agile management in transformational conditions. Nikonenko et al. (2022) emphasise the importance of investment policy in implementing Industry 4.0 technologies. Their findings emphasise the role of digital strategies in strategic adaptation. We agree that innovation is a key factor in our model. Prokopenko et al. (2023) found a positive impact of investment in renewable energy on the companies' financial performance. This supports our thesis about the importance of the innovation index for adaptability. Their forecasting model aligns with our approach to assessing companies' resilience.

So, the study's results confirm the relevance of Agile as an effective tool for adapting strategies in an unstable environment. The conclusions are consistent with current studies in management, construction, IT, and finance. This underscores the universality of agile approaches and the need for further cross-sectoral research on them.

The study has several limitations that must be taken into account when interpreting the results. First, the model does not account for the influence of foreign policy and regulatory factors, which can significantly affect the adaptability of strategies. Second, the sample includes only five countries and a

small number of companies. Besides, the adaptability index is subjective and based on expert assessments of strategic changes.

Further research should be conducted using real statistics and by expanding the sample's geographic scope. It is worth including indicators of financial stability, digital transformation and corporate culture of companies. It is also appropriate to determine the impact of Agile on strategic adaptability in a sectoral context. It is recommended to implement panel models that account for temporal dynamics and company-level effects. The practical use of the model enables assessment of the potential to adapt strategies under real management conditions.

4. CONCLUSIONS

The research has measured the impact of adopting Agile technologies on companies' agility in their economic strategy amid market uncertainty, using an international comparative sample of 15 companies in the USA, the UK, Germany, Ukraine, and China from 2021 to 2024. According to the econometric model, Agile adoption is a positive and statistically significant determinant of strategic adaptability. The most successful results of adaptability were achieved by companies with high Agile_Use (0.82), as well as by Nova Poshta (0.78) and Apple Inc. (0.75), thereby proving the efficiency of flexible managerial strategies in turbulent markets. The results of the study confirmed the proposed econometric model's potential to measure the impact of the Agile adoption rate on companies' strategic adaptability.

Enterprises with low Agile implementation, such as BP plc and Rolls-Royce Holdings, on the contrary, demonstrated adaptability levels between 0.44 and 0.51, indicating structural constraints and slower adaptation to external instability. It can also be seen that Innovation_Index is a significant auxiliary variable: companies with a high capacity to innovate systematically outperformed those with a lower capacity. Meanwhile, firm size did not prove to be a decisive factor, indicating that management practices are more important for adaptability than size.

Compared with other countries, Chinese and American companies achieved the highest average adaptability scores due to advanced technological infrastructure and high levels of digital maturity. The Ukrainian firms exhibited high growth in adaptability due to digitalisation, whereas German firms did not change and were more reliant on industry-specific factors. These findings underscore that Agile has quantifiable strategic advantages that are not geographic in nature, but that its efficacy depends on innovativeness and industry factors.

All in all, the study establishes that Agile technologies improve strategic resilience in times of uncertainty. The results enhance understanding of the role of flexible management tools in ensuring sustainable strategic performance across various economies. Further research must integrate actual financial indicators, expand the dataset, and introduce measures of cultural, institutional, and digital maturity to create a more complex framework for evaluating the strategic adaptability of global markets.

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Ястремська Олеся, Гулякін Євгеній, Голота Михайло, Савченко Вадим, Храпатий Сергій. Адаптація економічних стратегій підприємств до ринкової невизначеності за допомогою Agile-технологій. *Журнал Прикарпатського університету імені Василя Стефаника*, **13** (4) (2026), 37-51.

У статті розглядається актуальна проблема адаптації економічних стратегій компаній до ринкової невизначеності за допомогою Agile-технологій. Метою дослідження є визначення впливу гнучких управлінських підходів на стратегічну адаптивність компаній у п'яти країнах за 2021–2024 роки. Методологія базується на побудові багатофакторної економетричної моделі з використанням даних про 15 компаній зі США, Великої Британії, Німеччини, України та Китаю. Дослідження враховує такі змінні, як рівень впровадження Agile, ринкова невизначеність, індекс інновацій, галузева приналежність і розмір компанії. Результати моделі підтвердили позитивний вплив гнучких підходів на адаптивність стратегій: найвищі показники зафіксовано у Huawei Technologies (0,82), Новоїпошти (0,78) та Apple Inc. (0,75). Компанії з низьким рівнем впровадження Agile, такі як BP plc або Rolls-Royce Holdings, продемонстрували адаптивність на рівні 0,44–0,51. Отримані результати дають підстави зробити висновок про ефективність

гнучких методів у підвищенні стратегічної стійкості компаній до нестабільності зовнішнього середовища. Перспективними напрямками для подальших досліджень є розширення географії вибірки, включення реальної статистики та врахування цифрових і культурних факторів. Розроблена модель може бути застосована для стратегічного планування в контексті глобальних трансформацій і цифрової економіки.

Ключові слова: гнучкі технології, стратегічна адаптивність, ринкова невизначеність, економетрична модель, інновації, гнучке управління.