DOI: 10.31648/pw.12121

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GREAT BRITAIN, POLAND AND UKRAINE – THE NEW EUROPEAN TRIAD. INSTITUTIONAL MODEL OF INTERACTION IN LIGHT OF SELECTED METHODS

Abstract: The collaborative efforts between Poland, Ukraine, and Great Britain in military and political spheres have proven to be successful on a global scale, i.e., the problem of Ukrainian refugees has been effectively addressed. This prompted an investigation into the practicality of establishing a triad in the future, encompassing a wide range of industries and fields. Through the application of cluster analysis, it was determined that all these states fall within neighboring clusters formed by a range of social and economic factors. Simultaneously, they are positioned on a single side of the boundary, when only the contrast between the two permanently distinct environments is taken into account. The use of the Axelrod tournament enables the simulation of the outcomes resulting from the complex interaction of the three states. By implementing specific reforms in the five key areas highlighted in this article, this type of interaction can clearly lead to success. At the same time, under certain conditions, the success of such an association is possible even without any reforms in Ukraine.

Keywords: European associations, Axelrod tournament, clusterization, neural network

Introduction. An outline of the problem

In light of the current Russian aggression in Europe, the possibility of an alliance of Poland, Ukraine, and Great Britain has become increasingly likely. Brexit and a reconsideration of bilateral ties between Poland and Ukraine have contributed to this, but the war has had the most significant impact. Thus, it is difficult to envision Poland and Ukraine today being caught in the midst of historical conflicts and passionate disputes. Thanks to the joint efforts of the neighboring countries, the realities of border crossing conditions and humanitarian concerns have become evident in the economic sphere. Meanwhile, the integration of societies is a vital element that should not be disregarded. The current situation involving the export of Ukrainian grain and its temporary halt due to the demands from Polish farmers

implies that Ukraine's road to its EU membership after the war will not be without obstacles. "Fatigue with helping, and with the subject of the war and refugees, is a well-known phenomenon in the literature. Some increase in anti-Ukrainian behavior – which is still relatively rare in Polish society – is therefore unsurprising" (Balicka-Sawiak 2023).

At this point, we can see both actual issues and opportunities arise. Every country, Ukraine, Poland and Great Britain, has its unique institutional framework, encompassing political and market institutions that must take the lead in this collaboration. The origins of these variations can be traced back hundreds of years and play a crucial role in shaping citizens' daily experiences, strategies for defending their beliefs, the creation and trajectory of enterprises, and political endeavors. In addition, we should consider a unique group of defining institutions in post-war Ukraine, such as retired military personnel and the oligarchy with their established norms and practices, as well as a substantial army of volunteers, whose actions can serve as the catalyst for a renewed nation. Thus, our aim is to present the institutional model of interaction, in the cases of Ukraine, Poland and Great Britain, in light of selected methods.

1. Theoretical background

Through the lens of economics, we can forecast how people will behave in response to formal institutions, while also recognizing laws as drivers for modifying behavior and as a means for attaining policy objectives. Furthermore, lawyers can apply quantitative reasoning to formulate theories and conduct empirical research in ways similar to economists (see: Cooter 2016, 24). This particular scientific collaboration stands out as one of the most significant achievements in modern science. D. North (1991) described the main role of institutions as the "incentive structure of an economy; as that structure evolves, it shapes the direction of economic change towards growth, stagnation, or decline". J. Faundez examined the central concepts of institutional theory, drawing from North's renowned work. His analysis particularly emphasized the "failure adequately to account for the role of organizations in the process of change" (2016). O. E. Williamson (1985) presented economics of organization in terms of transaction costs. B. J. Loasby (2001) determined the role of market institutions as a guide to reasonable behavior through cost reduction in information search, negotiation organizing, and transaction monitoring. M. Sandberg and P. Lundberg (2012) noted that "the dominance of the core institutions of despotism has first been replaced by a dominance of the core institutions of oligarchy". They suggested that "changes in regime types occur at one level, while institutional dynamics work on another". K. Baldwin and K. Holzinger

(2019) suggested "that traditional institutions have more complicated relationships with democracy and accountability than these frameworks would predict".

Meanwhile, the European experience leaves no doubt that local self-governance is the fundamental element of the institutional system. The European Commission's report on the Local Autonomy Index for European countries can provide insight into the main aspects of this system (1990-2014) (Ladner | Keuffer | Baldersheim 2015). This scientific investigation delves into the evaluation of local autonomy in 39 European countries during the period of 1990-2014, employing a thorough methodology. Among them, Poland is distinguished for its particularly high level of local autonomy. The United Kingdom also presents an interesting case. M. Goldsmith (2010) described the English local system of governance as the most centralized one outside of Eastern Europe. In modern times, it may also be described as the most centralized one in the Western World (Blackhurst 2002), as the UK government and parliament maintain direct control over English local governments.

Since 2015, when the Law and Justice (PiS) party and its allies came to power, Poland has experienced significant changes in the functioning of state institutions. Scholars and international observers have noted increasing political influence over the judiciary and public media, raising concerns about the rule of law and democratic standards (see: Krzyżanowski 2017; Mrozowicki | Kajta 2020; Pytlas 2021). Some studies also point to the growing presence of nationalist narratives in political discourse. The Report on Self-governance in Poland identified the flaws within the Polish self-governance system (Bober et al. 2013), such as progressive nationalization of local self-governance, gradual weakening of democratic self-governance, administrative inefficiency associated with government domination, gradual decrease of financial autonomy of the local self-governance, financing the projects of current short-term needs by a simultaneously weak use of EU funds for stimulating long-term changes and development, the development of patrimonial and clientelistic relations; generation of the restricting social capital, spatially-disordered and uncontrolled territory management, which leads to pathological development of spatial relationships in urban areas, lack of the subjectivity development – a weak ability of most local communities to stimulate the development of their territory that causes its instability development.

Meanwhile, with the highest turnout since the fall of communism in 1989, the recent election in Poland resulted in the liberal Civic Coalition (KO) taking over from PiS and ended their eight-year rule. The high level of engagement, surpassing 70%, suggests that Poland's democracy is thriving and that the electorate values political involvement more than ever. The women's protests sparked in the fall of 2020 in response to unconstitutional actions by the Constitutional Court played a pivotal role in the opposition's victory. While the ruling party's aggressive propaganda failed to rally voters, it succeeded in mobilizing large crowds in support of Tusk during street protests, the largest since the collapse of communism. Narratives

about European bureaucrats plotting were seen as disconnected from reality by many voters. The ruling party's hypocrisy on migration was exposed when the deputy foreign minister resigned over involvement in a visa-selling scheme. Despite Law and Justice's portrayal of Tusk as evil, even right-wing voters found humor in memes and jokes. The immigration-focused referendum saw a low participation, rendering its outcome inconsequential by Polish law. Overall, the ruling party's campaign tactics proved disastrous. Opposition analysts say that the results bring hope that change is possible against an entrenched governing party, PiS, and that the process of 'democratic backsliding,' and conflict with the European Union and other partners can be resolved.

According to Ukrainian Law about the voluntary association of territorial communities, a legal entity – "a village, a settlement, a city council, located in the administrative center of a united territorial community, is the legal successor to the rights and obligations of all legal entities – a village, a settlement, city councils, elected by the united territorial communities, from the day of the acquisition of powers of the village, settlement, city council elected by the united territorial community". Therefore, the traditional Soviet model of contrived communities (manifested through community councils) persists in a somewhat obscured state.

S. Panasyuk (2018) considered the following problem: "Can the meaning of the term "local authority" change the essence of local democracy in Europe?". He repeatedly expressed his disagreement with the mistranslation of the European Charter on Local Self-Government into Ukrainian, wherein the key term and focus – "territorial community" is substituted with the term "local self-government".

K. W. Dam asserts that the rule of law cannot be achieved in a country without effective enforcement, regardless of any improvements in substantive law. The issue of behavioral independence among individual judges has been gaining significance in this field. Dam (2006) has researched traditional independence of English judges "despite the absence of constitutional structural independence and of any power of judicial review".

M. Ramos-Maqueda and D. L. Chen (2021) conducted a study on the impact of justice institutions on economic development, conflict, and institutional trust. C. E. De Vries and H. Solaz suggested that "the electoral punishment of corruption is rather mild". This highlights the fact that the electoral system alone cannot be relied upon to drive the development of society without significant transformations in other institutions (2017).

2. Methodological background

Our study revolves around examining the following hypotheses: 1) it is feasible for institutions to come closer together within the triad framework we have put forward, as long as citizens have a strong sense of their place and responsibilities in society; 2) through the use of existing strategies, state institutions are able to successfully bring about this convergence without requiring major changes within individual states. However, this is only applicable in highly adverse situations; 3) in order to address the resurgence of oligarchic influence, the inclusion of ex-military and politically engaged volunteer groups alone is insufficient in Ukraine without a range of institutional reforms.

The research is based on institutional theory, which focuses on how the most essential institutions influence the state of society and the economy. In the next stage, we address the issue of whether there exist models that enable us to determine the viability of this approach. Thus, we use statistical information from multiple countries to examine how different factors affect the level of happiness. Moreover, these factors are the core of our cluster analysis, which leads us to the determination of whether or not the discussion on the potential of the triad we have identified is justifiable. In the event of favorable circumstances, we employ the game theory (specifically, Axelrod's tournament) to evaluate the success of cooperation and identify tactics for optimizing its impact. It is important to highlight that the approach we have selected can be implemented with a variety of models. According to our analysis, Axelrod's competition plays a crucial role in determining our course of action. We believe that this approach enables us to make accurate inferences about particular scenarios, interactions, and alliances during times of ongoing crises.

Hence, our proposal is to employ game theory strategies as an effective instrument for examining interactions among institutions. In the late 1970s, R. Axelrod, a political scientist at the University of Michigan, organized a tournament to compare strategies for playing Prisoner's Dilemma. The prisoner's Dilemma is a paradox in decision analysis in which two individuals acting in their own self-interests do not produce the optimal outcome (Investopedia Team 2023). Axelrod invited the participants to submit strategies in the form of computer programs. Then, he played the programs against each other and kept the score. Specifically, they played the iterated version of Prisoner's Dilemma, in which the agents play multiple rounds against the same opponent, so their decisions can be based on history. In Axelrod's tournaments, a simple strategy that did surprisingly well was called 'Tit For Tat,' or TFT. TFT always cooperates during the first round of an iterated match; after that, it copies whatever the opponent did during the previous round. If the opponent keeps cooperating, TFT keeps cooperating. If the opponent defects at any point, TFT defects in the next round. However, if the opponent goes back to cooperating, so does TFT. In the current version of this game, the use of Python

code enables us to swiftly and efficiently perform these calculations. Understanding the state and primary attributes of specific institutions can be advantageous for utilizing the Axelrod code to anticipate the outcome of strategy interactions among players. It is worth mentioning that Axelrod's tournament has revealed the possibility of hundreds of strategies interacting across a range of games (such as Harmony, Chicken, Investment, etc.). Additionally, the user can develop their own strategy and make changes to it if necessary. It results in a tool that relies on fewer assumptions and simplifications, compared to other techniques. Simultaneously, crisis situations provide the opportunity to select a strategy that closely aligns with real-world scenarios. A viable approach for analyzing these data is to organize states into clusters according to a set of indicators. As J. Cortright (2006) notices, state and local policymakers as well as practitioners have increasingly embraced the use of 'cluster strategies' as an economic development approach. M. Citkowski (2020) considered a cluster as a useful instrument at any stage of the strategic management of regional development. The presence of a valid clustering system enables us to address whether there is a basis for anticipating effective interaction among the evaluated elements.

This research aims to apply economic analysis and programming methods to address the issue of collaboration among key government institutions, on the levels of both an individual state and a potential association. In order to apply the model of mutual influence among political institutions, we developed a factor model to explain the development of happiness, also known as the 'taste of life.' The performance of our model and the suitability of the selected factors for clustering were verified with the Python and R neural network packages. A necessary requirement for a successful association is the coexistence of countries in adjacent or identical clusters, according to the 2-cluster model. Both the Axelrod Tournament and its accompanying Python packages have been put into practice. The authors made a decision to assign specific strategies to different institutions. The researchers acknowledge that there are other potential choices beside the presented one. However, a specific leading strategy may arise from a diverse array of strategy sets. Strategic interaction occurs within the framework of the selected game (chicken, investment, deadlock, or hunting). The success or failure of the association is determined by the winning strategy. Alongside the achieved result, modifications are conducted, such as restructuring the institution, to convert the result into an advantageous one. The researchers acknowledge the existence of multiple alternative approaches for assessing the impact of state decisions on politics or the economy. In our view, due to the vast differences among the subjects of our study, it is necessary to focus on the game theory. We have chosen to concentrate on the Axelrod tournament due to its emphasis on individual strategies, as the construction of the payoff matrix involves numerous assumptions and simplifications of the interaction model. One of our hypotheses is examined through a model that employs neural networks,

which utilizes data from the World Happiness Report 2022 (Helliwell et al. 2022). It represents the extent to which six key variables contribute to explaining life evaluations. These are: the GDP per capita, social support, healthy life expectancy, freedom, generosity, and corruption. Happiness rankings are not based on any index of these six factors – instead, the scores are based on individuals' own assessments of their lives, as revealed by their answers to the single-item Cantril ladder life-evaluation question. Thus, we used the observed data on the six variables and estimated their associations with life evaluations to explain the observed variation of life evaluations across countries.

3. Research and empirical findings

The responses to the inquiry about the core institutions of society will differ among various individuals. The institutions encountered in their everyday life, or specifically in their daily occupation, carry considerable significance. The main topic at hand is the management of shared property and assets, primarily those held by the community. The significance of local self-governance is a key aspect. This foundation serves as the starting point for the growth of all other institutions, as it allows for the control over the most fundamental levels of representative bodies. Furthermore, this is where individuals are ensured the opportunity to actively engage in the decision-making process for managerial matters through means such as local referendums or general meetings. Many consider this level to be the most significant, and they are entitled to their opinion. It is a disappointment that, despite various historical preconditions, the British system of local self-governance remains one of the weakest in Europe, with a focus on top-down appointments rather than democratic elections.

Ukraine and Poland, by expanding their communities, have also greatly infringed upon the fundamental principles of local democracy and effective management at the grassroots level. Despite ongoing efforts, Ukraine has not been able to successfully confer a legal status to communities or accurately incorporate the key principles of the European Charter of Local Self-Government into its domestic legislation yet. Moving forward, the criminal justice system is the second most significant element of human well-being is the protection of individuals. The election system is another topic of discussion. In many developed countries around the world, party involvement in community-level elections is considered unsuitable and may even have negative consequences. Great Britain holds a significant position in this context. Poland has only recently embarked on a similar journey. Ukraine has recently emerged from the clutches of the oligarchic system and it is hoped not to revert back during the post-war period.

The mode of conducting business is entirely dissimilar. Britain has a well-established tradition of maintaining a powerful banking system and stock market. It is certainly not the US market with the maximum emphasis on the interests of the smallest shareholder, but the principles of construction and operation of such a market are among the best ones in the world. Poland has recently followed the same path, with its stock market now recognized as developed. This is in stark contrast to the Czech and Hungarian markets, which have shown significant positive changes in Poland's favor. The choice for the technology business makes this market extremely promising. Unfortunately, Ukraine has one of the worst business functioning models in Europe. Before the war, the stock market continued to be the primary interest of a cluster of major energy and raw material companies, while the agricultural industry sought funding from the nearby Polish stock market. Tax planning schemes have enabled Ukrainian companies to operate in Poland under the residency of countries such as Cyprus, the Netherlands, Luxembourg, and others. The ongoing war has solidified the current state of these companies, and it can be argued that their fate is closely tied to whether or not Ukraine's push for reform will be successful. This indicates that some aspects of these businesses will evolve to the standards of contemporary European companies, which operate with equitable regulations and transparency, while others will cease to function. As for the judiciary, at least the smallest unification of the three mentioned states would be an incredible success. It is worth mentioning that both Ukraine and Poland

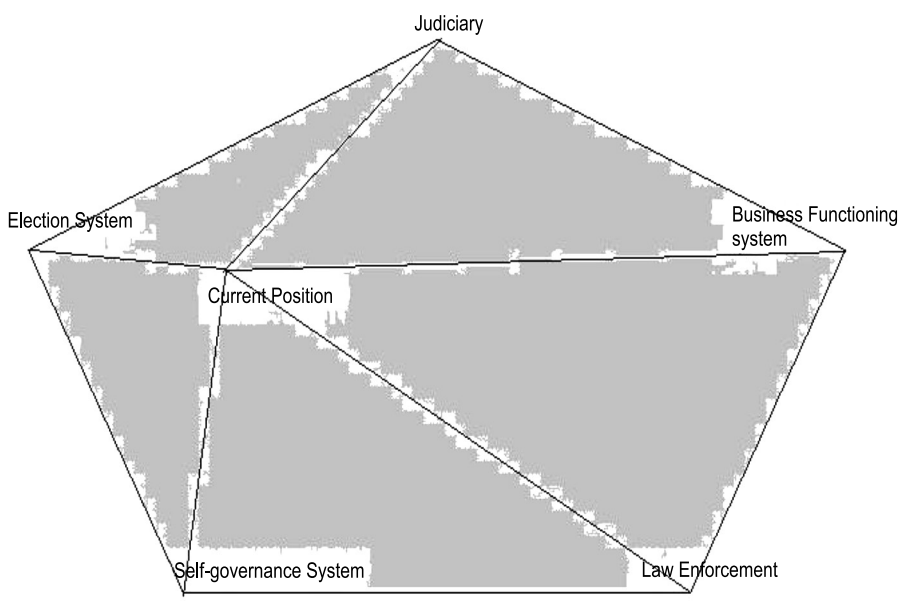


Figure 1. The general model including main components of the state's institutional environment

encounter significant challenges. The Parliament passed a new law in 2020 that prohibits Polish judges from using the rulings of European courts in cases involving judicial independence, particularly those that have condemned the actions of the Polish government (Adamska-Gallant 2022).

Thus, the fundamental structure of our model resembles a pyramid, with the pinnacle (representing the present state) situated at a certain distance from each of the designated institutions or systems (Figure 1). The most stable system is typically considered the most desirable, depending on the prevailing taste of life in certain countries. If any of the institutions is in a state of deterioration or is negatively impacting others, it can cause the current state to exceed the boundaries of the institutional pyramid, potentially leading to its collapse.

Our next step is to identify a suitable model that can serve as a solution for understanding the impact of institutional environments on social life. Our analysis relies on data obtained from the World Happiness Report (Helliwell et al. 2022).

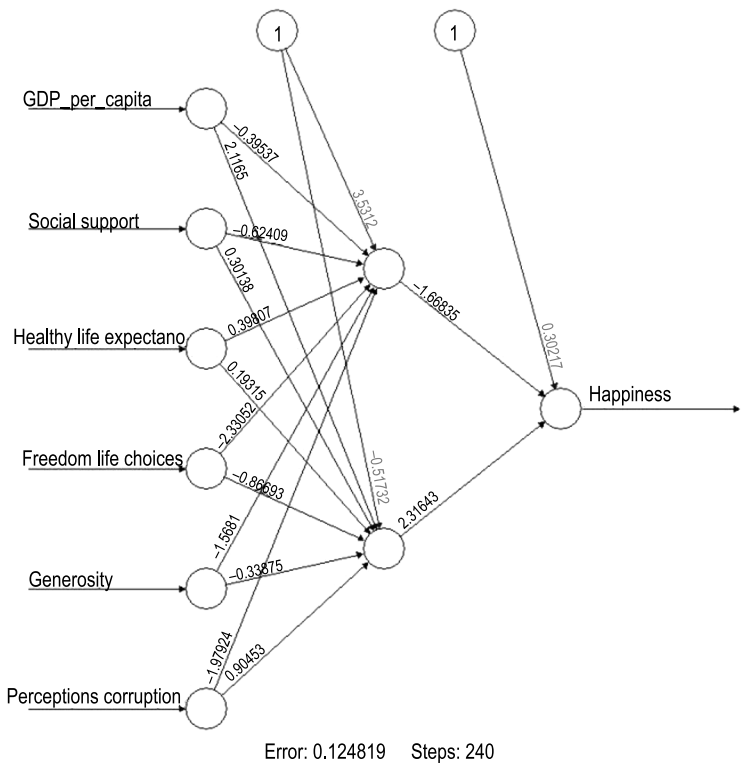


Figure 2. Happiness as a function of life impediments
Source: own elaboration based on Halliwell at al. (2022). The model: the authors' own elaboration based on a neuralnet package of R. Threshold=0.001, error function = 'sum of squared errors', algorithm = 'smallest learning rate'. Model accuracy = 66%.

The data presented in the report reflect individuals' self-evaluations of their lives in over 150 countries, which makes happiness a possible dependent variable. We have selected the GDP per capita, the level of social support, health expectancy, freedom of choice, generosity, and perception of corruption as our independent variables. The variables included in the model, namely neurons (Figure 2), reflect the 'work' of particular institutions or groups of institutions presented in Figure 1. By implementing a neural network approach, we developed a model with a single hidden layer of two neurons. This strategy could be regarded as the most viable, given that the neural network-based model emulates the operations of human brain. In traditional models, researchers typically split the existing database into sections for both training and testing the model, with the accuracy coefficient being calculated on the basis of the results of the testing. The model's functionality is demonstrated by the accuracy of 66%, although it does not meet the highest standard.

The available factors provide a comprehensive understanding of the model, allowing for the utilization of all the proposed variables in the clusterization process (Figure 3).

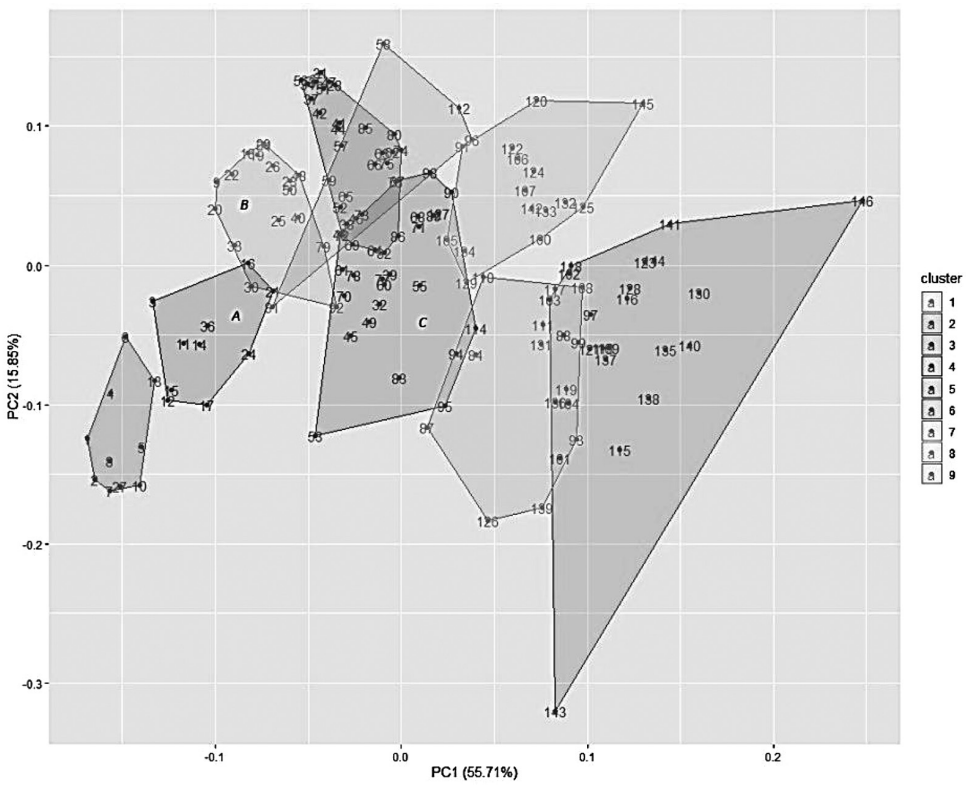


Figure 3. Clusterization: separated groups
Source: The authors' own elaboration based on the data from the 2022 World Happiness Report.

As we can see in Fig. 3, Great Britain (#17) is situated in cluster A, together with Austria (#11), Germany (#14), Canada (#15), Estonia (#36) and some other countries. Poland's (#48) neighbors in cluster B are: Slovenia (#22), France (#20) and even Azerbaijan (#92). Ukraine (#98) is situated in cluster C, together with Albania (#90) and Kosovo (#32).

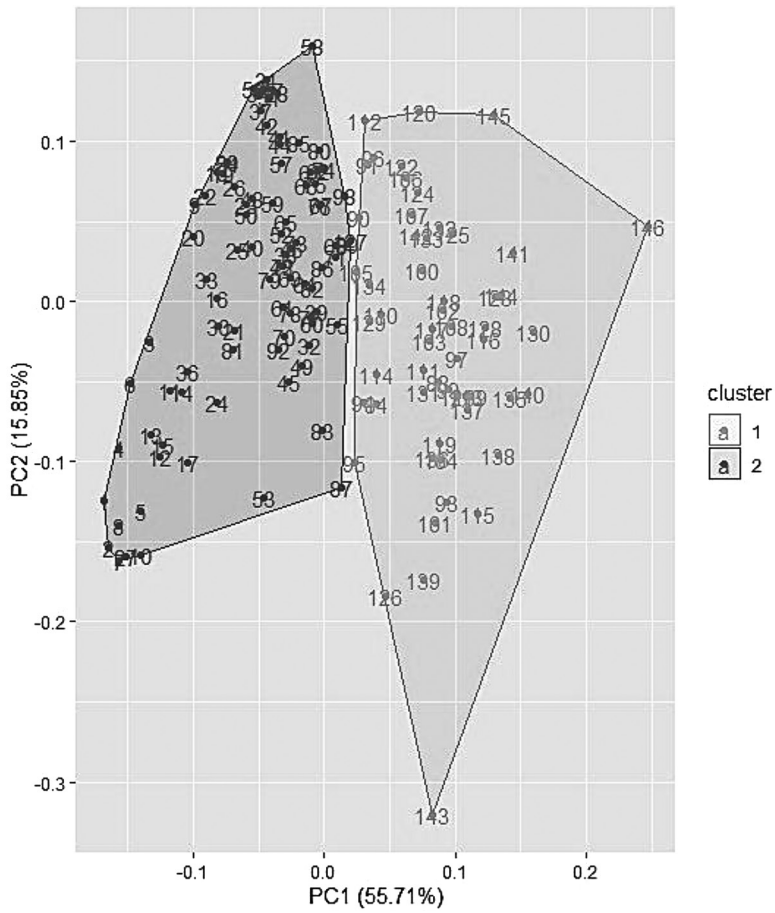


Figure 4. Clusterization: the case of unification
Source: The authors' own elaboration based on the data from the 2022 World Happiness Report.

It should be noted that these clusters are in close vicinity to each other, and this does not pose any complications. On the other hand, when establishing a watershed with respect to the entire dataset, Ukraine is grouped together with Poland and Great Britain. It should be noted that the selection of the optimal number of clusters is well supported: 9 evaluation measures suggested 2 clusters as the most suitable, while 7 suggested 9 clusters. Several factors may have a major impact (Figure 5).

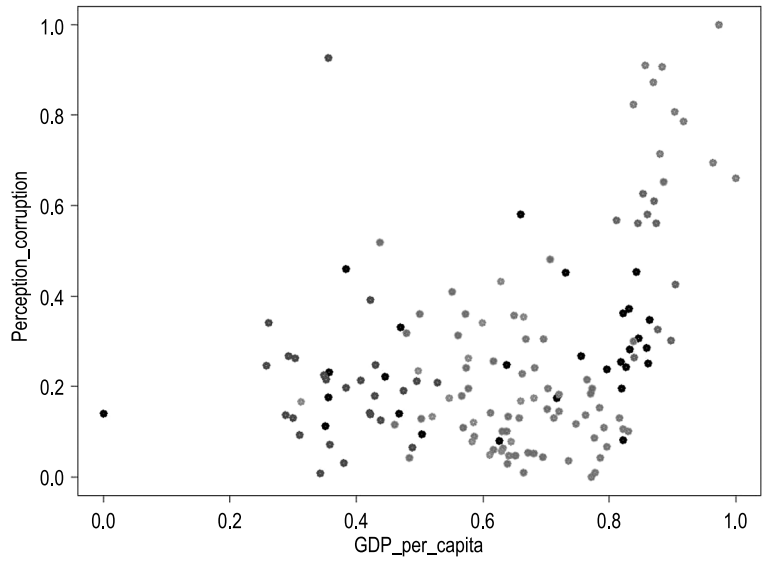


Figure 5. GDP and the perception of corruption
Source: The authors' own elaboration based on the data from the 2022 World Happiness Report.

However, upon examination, it is evident that these two variables alone do not suffice for cluster differentiation, despite our belief that they are the most descriptive. Therefore, our first hypothesis is supported by the results of the cluster analysis. After establishing the likelihood of this associative alliance, we can now progress to forecasting its outcomes. In our study, the Axelrod tournament is an extremely valuable tool for examining the behavior patterns of individual institutions over an extended period of time. Table 1 provides concise explanations of the most commonly used strategies that will be employed in our upcoming simulations.
For every institution in the three states, we implemented a specific strategy (Table 2). A multitude of rationales supports the decision to use Backstabber in Ukraine's business operations or Memory Two Players in Great Britain's election process. At the same time, it is not our intention to discourage the use of different strategies within these sets.

The data in Table 3 reveal the effects of cooperation in Ukraine without any adjustments to the existing institutional framework. In situations of deadlock, rationality is crucial in achieving a favorable outcome. When faced with a game in which the optimal course of action is mutually advantageous and dominant, it cannot be assured. Hence, our aim is to impact the modifications of individual institutions (Table 4).

Table 1. The main Axelrod tournament strategies used in our analysis

Strategy	Short description
Short Memory	The player starts by cooperating in the first 10 moves. From the tenth round onward, the player analyzes the last ten actions of the opponent and compares the number of defections and cooperations. The next action is chosen accordingly.
Resurrection	The player starts by cooperating but defects if more than five rounds have been played and the last five opponent's actions were defections. Otherwise, the strategy behaves similarly to Tit-for-Tat.
Gambler	A stochastic version of LookerUp, where the player randomly selects an action in some cases.
Backstabber	The player forgives the opponent's first three defections but, upon the fourth, defects forever. Additionally, it unconditionally defects in the final two rounds. ("Even my patience has its limits.")
Grumpy	The player defects once a certain level of 'grumpiness' is reached. Grumpiness increases with the opponent's defections and decreases with their cooperations.
LookerUp	This strategy uses a Lookup Table to determine its next action.
Hand Shake	A player starts with the following sequence: Cooperative, Defect. If the opponent responds with the same sequence, the player cooperates forever; otherwise, it defects forever.
Stalker	The strategy bases its actions solely on the accumulated score.

Source: The documentation for the Axelrod Python library, [in:] https://axelrod.readthedocs.io/en/fix-documentation/ (accessed: 17.09.2023).

Table 2. Axelrod tournament

Ukraine	Judiciary – Short Memory, Election system – Resurrection, Self-governance – Gambler, Business functioning – Backstabber, Law enforcement – Grumpy Analyzed game: Chicken Game. Ranking of winners: 'Grumpy', 'Resurrection', 'ShortMem', 'Gambler', 'BackStabber Noise =40% (20%)*, number of turns = 1500
Great Britain	Judiciary – LookerUp, Election system – Memory Two Players, Self-governance system – Cooperator, Business functioning – Hand Shake, law enforcement – Defector Hunter Analyzed game: Investment Game. Ranking of winners: 'LookerUp', 'Cooperator', 'Defector Hunter', 'Memory Two Player', 'Handshake' Noise =10%, number of turns = 1500
Poland	Judiciary – TrickyCooperator, Election system – Memory One Player, Self-governance – Short Memory, Business functioning – Stalker, Law enforcement – Defector Hunter Analyzed game: Stag Hunt Game** Ranking of winners: 'ShortMem', 'Defector Hunter', 'Stalker', 'Tricky Cooperator', 'Memory One Player'] Noise =10%, number of turns = 1500

Notes: * – noise decrease does not change the result of model, ** – solidarity of Polish farmers against Ukrainian export of grain is a good illustration of the game type

Table 3. Cooperation result

Game	Result of game
Investment game, turns = 1500, noise = 0.1	'Grumpy', 'ShortMem', 'LookerUp'
Chicken game, turns = 1500, noise = 0.1	'Grumpy', 'LookerUp', 'ShortMem'
Prisoners Dilemma, turns = 1500, noise = 0.1	'ShortMem', 'LookerUp', 'Grumpy'
Moran process, turns = 1500, noise = 0.1	Short memory - winner
Stag Hunt, turns = 1500, noise = 0.1	'Grumpy', 'ShortMem', 'LookerUp'
Deadlock, turns = 1500, noise = 0.1	'LookerUp', 'ShortMem', 'Grumpy'

Note: The deadlock game is a game in which the action that is mutually most beneficial is also dominant.

Table 4. Results of modifications

Initial: Judiciary – Short Memory, Election system – Resurrection, Self-overnance – Gambler, Business functioning – Backstabber, Law enforcement – Grumpy	Changed: Judiciary – Short Memory, Election system – Memory Two Player, Self-governance – Gambler, Business functioning – Backstabber, Law enforcement – Grumpy
Result for Ukraine: 'Memory Two Player', 'Grumpy', 'Gambler', 'ShortMem', 'BackStabber	Result for new Triad: 'Memory Two Player', 'ShortMem', 'LookerUp'
Initial: Judiciary – Short Memory, Election system – Resurrection, Self-governance – Gambler, Business functioning – Backstabber, Law enforcement – Grumpy	Changed: Judiciary – Short Memory, Election system – Resurrection, Self-governance – TitForTat, Business functioning – Backstabber, Law enforcement – Grumpy
Result for Ukraine: 'Grumpy', 'Tit For Tat', 'Resurrection', 'ShortMem', 'BackStabber	No change
Initial: Judiciary – Short Memory, Election system – Resurrection, Self-governance – Gambler, Business functioning – BackStabber, Law enforcement – Grumpy	Changed: Judiciary – Short Memory, Election system – Resurrection, Self-governance – Gambler, Business functioning – Stalker, Law enforcement – Grumpy
Result: 'Grumpy', 'Stalker', 'Gambler', 'ShortMem', 'Resurrection'	No change
Initial: Judiciary – Short Memory, Election system – Resurrection, Self-governance – Gambler, Business functioning – BackStabber, Law enforcement – Grumpy	Changed: Judiciary – Short Memory, Election system – Resurrection, Self-governance – Gambler, Business functioning – BackStabber, Law enforcement – Defector Hunter
Result: 'Defector Hunter', 'Gambler', 'Resurrection', 'ShortMem', 'BackStabber'	Result for new Triad: 'ShortMem', 'LookerUp', 'Defector Hunter'

Note: The Chicken Game was chosen for testing the potential reform results. The model selection was based on the level of risk involved in unification, particularly in the current post-Brexit and post-war time with Poland's unique position in the EU.

According to Table 4, the key to the success of the Defector Hunter game lies in the reform of Ukraine's law enforcement system. Additionally, should Poland continue to enhance its local self-governance system, the outcome could be even more advantageous. We must remember that Ukraine is situated nearby, and any improvements in self-governance are likely to be influenced by such developments. In the aftermath of war, Ukraine is likely to see the emergence of new institutions, including volunteerism, driven by the powerful experiences of war and its results, as well as post-military and oligarchic influences. They can be regarded as both an organization and an institution, operating as a structured means of behavior. We can hypothesize that our war allies will adopt a Punisher-like approach. The oligarchy, as an institution, has opted for the Retaliate strategy, indicating their willingness to cooperate and accept losses of less than 10%. A possible solution for post-military and volunteer individuals could be the implementation of the Grudger strategy, which involves starting with cooperation and then defecting whenever the opponent defects. Another option could be the LookerUp strategy, which utilizes a Looker Up table to determine the next course of action. So, the findings support the validity of our third hypothesis.

Table 5. The game with new institutions

players = [axl.ShortMem(), axl.Resurrection(), axl.Gambler(), axl.BackStabber(), axl.Grumpy(), axl.Punisher(), axl.Retaliate(), axl.LookerUp(), axl.Grudger()]. Noise = 0.1. Chicken Game.	[‘Grumpy: Nice, 10, -10’, ‘LookerUp’, ‘Gambler’, ‘ShortMem’, ‘Resurrection’, ‘Punisher’, ‘BackStabber: (D, D)’, ‘Retaliate: 0.1’, ‘Grudger’]

Note: The simplest version of code is proposed in Appendix 1.

4. Final remarks and discussion

In order to examine the suitability of approaches utilized by others in this particular field of study, we aim to provide a case study of the 2019 Brexit. After making certain assumptions, a gain matrix was constructed and suggestions were provided to the key participants involved in the process. Additionally, it was noted that this particular understanding of Brexit is oversimplified and naive (Mayer 2019).

When examining the behavioral tactics employed in the EU over the past few decades, the following categories can be identified: Collective.Strategy, CyclerDDC, CyclerCCCDCD, GTFT (generous TFT), Resurrection, and HandShake. The strategy of Great Britain is the last one that we believe should be taken into consideration. The essence of these strategies is clearly reflected in their letter designations. In high-risk situations, the strategy of Great Britain proves to be entirely unsuccessful, rendering its participation in the joint game irrelevant.

The authors assert that during times of persistent crises, the key to forecasting and examining short-term political processes lies in the analysis of strategies, while the implementation of alternative techniques poses challenges.

5. Conclusions

Using a neural network approach, our model can effectively measure happiness with a 66% accuracy, taking into consideration various factors such as the GDP per capita, social support, healthy life expectancy, freedom in life choices, generosity, and perceptions of corruption. The effective implementation of our model allowed for clustering and the identification of the location (i.e. differentiation) in relation to one another for the three states (i.e. (Poland, Ukraine, Great Britain), utilizing the specified factors, and adjusting for a close-far context.

Our findings indicate that all states can be found within neighboring clusters, and when divided into two opposing clusters, they all fall on the same side of the border. The main components of the state's institutional environment that we selected include: judiciary, election system, self-governance system, business functioning system, and law enforcement. We are confident that it is feasible to select the most pertinent strategies from the Axelrod tournament to model the behavior of these systems in all the three states. Interstate interactions led to the development of strategies – winners, which aimed to answer the question of whether cooperation among three states was effective, considering their initial strategies.

The study highlights how reforming a specific institution leads to a shift in approach. This successful transformation of a single institution can reveal multiple effective strategies within the same context. Concurrently, the data in Table 2 illustrate the scenario where an alliance can be successful without any major changes, as evidenced by the Deadlock game. The second hypothesis was based on this assumption, which was subsequently validated by the authors.

According to our last model, there is a clear requirement for extensive restructuring of the specified political institutions. Meanwhile, despite facing significant external political and economic influences, the emergence of two new institutions (i.e. former military and volunteers) dedicated to fostering changes and expected attempts to revive the oligarchy does not alter the final result, as all the institutions continue to interact in the same manner.

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Appendix 1. Code example

```
import axelrod as axl
chicken = axl.game.Game(r=0, s=-1, t=1, p=-10)
players = [axl.ShortMem(), axl.Resurrection(), axl.Gambler(), axl.BackStabber(), axl.Grumpy(), axl.Punisher(), axl.Retaliate(), axl.LookerUp(), axl.Grudger()]
tournament = axl.Tournament(players, game=chicken, turns = 365, noise = 0.1)
results = tournament.play()
results.ranked_names
['Grumpy: Nice, 10, -10', 'LookerUp', 'Gambler', 'ShortMem', 'Resurrection', 'Punisher', 'BackStabber: (D, D)',
'Retaliate: 0.1', 'Grudger']
```