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DETERMINANTS OF ENTERPRISE ADAPTATION TO CLIMATE CHANGE: A COMPARATIVE PERSPECTIVE OF NEOCLASSICAL AND INSTITUTIONAL ECONOMICS

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ABSTRACT: Enterprises increasingly seek to adapt to climate change in order to reduce its adverse economic and environmental impacts. Yet, the determinants of such adaptive behaviour remain insufficiently explored, particularly from the perspective of economic theory. This study addresses the question of what factors drive or constrain adaptation decisions among enterprises, comparing the explanatory power of neoclassical and institutional economics. It further examines whether government intervention is essential for effective adaptation or whether market mechanisms can function autonomously, and to what extent adaptation requires the establishment of specific institutional frameworks. The article fills a research gap by integrating theoretical analysis with empirical evidence from Polish agricultural enterprises—one of the sectors most exposed to climate risks. The study applies a mixed-method approach, combining literature review, comparative analysis, and a diagnostic survey. The findings confirm that the imperfections of market mechanisms necessitate the creation of institutions to support adaptation processes.

KEYWORDS: adaptation policy, climate change, adaptive behaviour, neoclassical economics, institutional economics, mandatory insurance

Introduction

The consequences of climate change are complex, far-reaching, and often unpredictable, leading to a wide spectrum of effects ranging from catastrophic to non-catastrophic impacts. Both types of consequences exert a profound influence on the operations of enterprises, prompting the search for effective responses – both preventive measures aimed at mitigating further climate change and adaptive strategies that enable adjustment to new environmental conditions.

Preventive actions primarily focus on reducing greenhouse gas emissions, widely recognised as the principal anthropogenic driver of climate change. Such measures often involve substantial challenges related to infrastructure investments, technological innovation, or organisational transformation. Their overarching goal is to optimise adaptation and mitigation efficiency while minimising financial costs associated with socially and economically acceptable levels of risk (Lorek, 2023).

Although some effects of climate change – such as longer growing or tourist seasons – may yield limited short-term benefits, these are far outweighed by the adverse consequences. Consequently, this article focuses on the necessity of adaptation rather than assessing the overall balance of climate impacts.

Adaptive measures can be understood as proactive or reactive actions undertaken by enterprises to cope with, or capitalise on, changing climatic conditions. In the case of extreme events, such measures are designed to minimise losses arising from catastrophic weather phenomena. In less severe circumstances, they aim to enhance resilience to variable conditions, including temperature extremes and fluctuations in precipitation.

These considerations raise several key questions: What factors influence enterprises' decisions to undertake adaptation measures? How do neoclassical and institutional economics differ in explaining these decisions? Is government intervention essential for effective adaptation, or can market mechanisms function autonomously? Finally, does adaptation necessitate the establishment of specific institutional frameworks?

This study addresses these questions by comparing the determinants of adaptation according to neoclassical and institutional economics and by verifying the need to introduce mandatory insurance as an institutional mechanism supporting adaptation – an issue that has not been comprehensively analysed to date.

The central research hypothesis assumes that the imperfections of market mechanisms necessitate the establishment of institutions to ensure effective adaptation to climate change.

To verify this hypothesis, the study employed a mixed-method approach comprising:

- a literature review,
- a comparative analysis of theoretical frameworks to identify similarities, differences, and causal relationships, and
- a diagnostic survey conducted among 234 Polish agricultural enterprises.

The empirical sample included farms operated by legal persons and organisational units without legal personality, classified under Section A, Division 01 of the Polish Classification of Activities – specifically, 01.1 (non-perennial crops) and 01.2 (perennial crops). Respondents were selected using convenience sampling, ensuring representation across all 16 Polish voivodeships to maintain geographical diversity.

Adaptation to Climate Change According to Neoclassical Economics

From the neoclassical perspective, individuals and enterprises are regarded as the primary agents responsible for addressing the consequences of climate change through rational market behaviour and consumer choices. Government intervention is justified only when market mechanisms fail to allocate resources efficiently (Kent, 2012).

Neoclassical economics assumes that adaptation arises from the functioning of market mechanisms, where self-interested participants make rational decisions aimed at maximising utility and efficiency (Congleton, 2006). Effective adaptation, therefore, depends on a favourable environment that enables informed decision-making. The adaptive capacity of individuals is shaped by informational, financial, institutional, and technological constraints (Stern, 2006).

Within this framework, the role of the government is primarily facilitative rather than interventionist – to define property rights, correct information asymmetries, address moral hazard and adverse selection in insurance markets, and finance research and education on climate change (Stern, 2006; Berkhout, 2005; Aakre & Rübbelke, 2010; Osberghaus et al., 2010).

The neoclassical approach focuses on the division of responsibilities between public and private actors and the selection of adaptation strategies. Policy intervention is justified in cases of market failure, yet the state is treated as an external market participant, with limited consideration of its actual capabilities or incentives. Given the multidimensional and interdisciplinary nature of climate adaptation, this narrow perspective appears theoretically limited.

Critics of the neoclassical framework emphasise that human behaviour is not uniformly rational and is influenced by norms, preferences, and social context (Cox et al., 2007; Crawford & Ostrom, 1995;). Collective action often emerges through reciprocity, trust, and informal cooperation, rather than through market incentives alone (Ostrom, 2009). Overly centralised state intervention may, paradoxically, weaken such social mechanisms by reducing community trust and self-organisation.

Moreover, the neoclassical framework underestimates the role of institutional environments in shaping adaptive decisions. Numerous empirical studies have demonstrated that institutions – formal and informal – play a decisive role in determining adaptive capacity (Adger et al., 2007; Engle & Lemos, 2010; Coleman, 2011). Institutional conditions define the barriers, drivers, and enabling mechanisms that influence adaptation outcomes.

Adaptation to Climate Change According to Institutional Economics

In contrast to the neoclassical view, institutional economics places institutions at the centre of adaptation processes. Institutions are commonly defined, following North (1990), as “the rules of the game in society” – formal and informal constraints devised by humans that shape their political, economic, and social interactions. They establish rights and obligations, reduce uncertainty, and structure incentives for cooperation (North, 1984; Bromley, 2006).

Institutions also reinforce social norms and values through systems of rewards and sanctions (Ostrom et al., 1992) and thus become a framework guiding human behaviour. They influence how actors perceive situations, define rationality, and assess fairness in decision-making. By providing predictability and setting procedures, institutions reduce conflict, facilitate cooperation, and determine the distribution of power and authority (North, 1990; Ostrom, 2005; Paavola & Adger, 2005).

From an institutional economics perspective, adaptation takes place within multi-level governance systems, involving various levels of jurisdiction and diverse actors (Adger et al., 2005; Cash et al., 2006). The main challenge lies in coordination failures, overlapping competencies, and the risk of “free riding” (Keskitalo, 2010). An institutional approach highlights the interactions and dependencies among actors engaged in adaptation, showing that outcomes depend not only on resources but also on trust, legitimacy, and communication (Knight & Sened, 1995; North, 1991).

Recent studies further demonstrate that integrated institutional arrangements enhance coordination among local administrations and resource users. Such arrangements enable adaptive governance and prevent conflicts over resource use. Roggero (2015) finds that while integrative institutions are not a necessary condition for successful adaptation, they significantly improve policy coherence and social acceptance by facilitating cooperation across administrative levels.

Adaptation to climate change according to neoclassical vs institutional economics

To compare how neoclassical and institutional economics interpret adaptation to climate change, several comparative criteria were established. These include: the capacity of enterprises to undertake adaptation independently; the degree of rationality in decision-making; the efficiency of resource allocation; the role of government intervention; and the necessity of institutional support. Additional criteria concern equality and justice in adaptation, shared responsibility among stakeholders, the role of learning processes, and the potential need for mandatory weather-risk insurance.

The results of this comparison are summarised in Table 1.

Table 1. Adaptation to climate change according to neoclassical vs institutional economics

Criterion	Neoclassical Economics	Institutional Economics
Ability of enterprises to undertake adaptation independently	Yes	No
Rationality of decision-making in adaptation	Yes	No
Optimal allocation of resources through market mechanisms	Yes	No
Need for government intervention	Only in cases of market inefficiency	Yes
Role of institutions	Only when correcting market failures	Essential component of adaptation
Consideration of equality and justice	No	Yes
Responsibility for adaptation	Individual responsibility	Collective (shared) responsibility
Importance of learning and knowledge exchange	Limited	Central to adaptation
Need for mandatory weather-risk insurance	No	Yes

The neoclassical approach posits that efficient adaptation emerges from market-based allocation of resources, where individuals act rationally to maximise utility. According to this view, adaptation is achieved when marginal benefits equal marginal costs (Mendelsohn, 2000; Osberghaus et al., 2010). Government intervention is warranted only in cases of market failure, such as externalities or public goods provision. Under ideal market conditions – consistent with the first and second theorems of welfare economics – resource allocation naturally converges toward the Pareto optimum (Mas-Colell et al., 1995).

Neoclassical economists identify two potential roles for government in adaptation:

1. Indirect, by supporting autonomous adaptation through market incentives, information provision, and property rights; and
2. Direct, by supplying adaptive public goods such as flood embankments (Berkhout, 2005; Mendelsohn, 2000; Osberghaus et al., 2010).

However, even within this framework, the scope of government intervention remains limited to correcting clear inefficiencies or providing goods that markets fail to deliver efficiently (Fankhauser et al., 1999; Stern, 2006). A key example of market failure is the provision of public goods, where individuals have incentives to free ride (Bator, 1958;). Determining the optimal supply of adaptive public goods thus requires balancing aggregate marginal benefits against marginal public costs.

Two important qualifications emerge.

First, public adaptation projects can become prohibitively costly – e.g., flood defences for low-density areas may not be economically justified.

Second, although public goods are typically non-rival, their benefits are often localised, such as dams or levees protecting specific communities rather than entire nations. Therefore, an effective adaptation policy requires central coordination to minimise regional disparities and manage potential negative externalities.

Institutional and political constraints – such as opportunism, conflicting interests, or limited administrative capacity – can, however, result in government failure and hinder effective adaptation (Oates, 1999).

In contrast, institutional economics argues that economic actors do not always behave rationally or possess sufficient knowledge to make optimal choices. Instead, collective action, governance structures, and institutional rules shape adaptive behaviour (Urwin & Jordan, 2008; Heuson et al., 2012). Market mechanisms alone fail to ensure fairness, equality, or justice – hence, adaptation must be embedded within public decision-making processes that reconcile political, social, and ethical considerations (Gawel et al., 2012).

Institutional economists emphasise that adaptation requires coordinated governance across multiple levels. Some scholars advocate for local-level management, provided that sufficient autonomy and resources are devolved (Dodman & Satterthwaite, 2008; Keskitalo & Kulyasova, 2009; Naess et al., 2006). Others, however, highlight the need for central government involvement due to its greater strategic and financial capacity (Baker et al., 2012; Few et al., 2011).

A purely market-based approach also neglects ethical dimensions such as justice, solidarity, and protection of vulnerable populations (Adger, 2016). Evidence shows that those most exposed to climate risks typically have the lowest adaptive capacity (Cash et al., 2006; Berkhout, 2005). Thus, governments have a duty to establish social safety nets and short-term support mechanisms to protect the most vulnerable (Fankhauser et al., 1999; Osberghaus et al., 2010).

Institutional economics further addresses equity and fairness in adaptation – both within and between societies (Adger et al., 2007; Roberts, 2009; Agrawal, 2010). Developed countries, having historically contributed most to greenhouse gas emissions, bear a moral and practical responsibility to assist developing nations with limited adaptive capacity (Goklany, 2007; Parry et al., 2005).

Economic theory distinguishes between vertical and horizontal equity.

- Vertical equity concerns redistribution between income groups, often justified through progressive taxation and welfare policies (Atkinson & Stiglitz, 1980).
- Horizontal equity implies that individuals in similar circumstances should be treated equally.

From this perspective, government support for adaptation may be warranted when economic entities lack the financial capacity to undertake necessary measures (Forster & Lilliestam, 2009).

The concept of shared responsibility has become central to modern adaptation and disaster risk management. Governments, civil society, and private actors share obligations to prepare for and respond to climate-related hazards (Box et al., 2016; McLennan & Handmer, 2012). Community engagement enhances both resilience and social legitimacy of adaptation policies (Scolobig et al., 2015; Adger et al., 2011).

At the same time, the neoliberal shift towards privatisation of risk has led to the notion of self-responsibility – where enterprises are expected to insure themselves against local risks (Barnett, 2003). Governments encourage this through regulations, subsidies, public–private partnerships, and mandatory insurance schemes. Although market-based insurance models are often presented as efficient tools for adaptation (Lobo-Guerrero, 2010), tensions persist regarding the fair distribution of responsibilities among households, insurers, and public authorities (Adger, 2013).

From the neoclassical standpoint, a government's failure to secure adequate insurance coverage signals irrationality and misjudgment of low-probability risks (Botzen & Van den Bergh, 2009; Schwarze et al., 2011). In this view, the state and insurers play not only a protective role but also an informational and motivational one – encouraging individuals to adopt preventive measures.

Institutional economists, meanwhile, underscore that effective adaptation depends on learning and feedback processes at both individual and societal levels. Barriers such as limited cognition, selective information, and entrenched worldviews hinder adaptive learning (Pahl-Wostl, 2009; Grothmann & Patt, 2005; Heyd & Brooks, 2009; Adger & Vincent, 2005). Strengthening the science–policy interface and fostering participatory learning are therefore crucial for building adaptive capacity and social resilience.

The Role and Barriers of Insurance in Adaptation According to Neoclassical and Institutional Economics

In a market economy, private insurance serves as a primary tool for individual adaptation to climate risks (King et al., 2013; Porrini & Schwarze, 2014; Booth & Tranter, 2018). The insurance premium functions as an objective indicator of risk, encouraging individuals and enterprises to manage their exposure. For governments, private weather insurance offers a means of reducing the fiscal burden associated with increasing climate-related damages (Surminski, 2018; European Commission, 2018; National Working Group on Financial Risk of Flooding, 2009).

From a neoclassical perspective, transferring risk from individuals – who may underestimate or ignore potential threats – to risk-neutral insurers enhances overall welfare and incentivises precautionary behaviour. Within an appropriate institutional framework, including well-defined property

rights and credit systems, insurance markets can provide effective adaptation tools. However, their performance is often constrained by information asymmetries, such as adverse selection and moral hazard, which justify limited government intervention.

According to insurance theory, an insurer provides protection against future losses in exchange for premiums, maintaining a risk-neutral position where expected losses equal expected revenues (Schoemaker, 1982). When individual risks are predictable, premiums can be calculated based on expected losses. Yet, when insured parties can influence their risk level – or when insurers lack accurate information – market distortions occur. These distortions, rooted in information asymmetry, lead to underinsurance or exclusion of high-risk clients (Rothschild & Stiglitz, 1976).

These challenges are particularly acute in the context of climate change, where the probability and intensity of extreme weather events are not only uncertain but also dynamic (Muller-Furstenberger & Schumacher, 2009). As a result, insurers face difficulties estimating long-term losses and may respond with higher premiums or by withdrawing from high-risk markets (Shavell, 1987).

Experience with natural disasters suggests that both governments and private actors are rarely indifferent to victims. However, expectations of government compensation may weaken incentives for private insurance and encourage risk-taking behaviour. Therefore, from a neoclassical viewpoint, ex post public assistance should be limited to essential support only. Instead, governments should focus on regulating insurance markets – reducing moral hazard and adverse selection through tools such as public risk registers, building codes, or transparency requirements (Osberghaus et al., 2010).

From an institutional economics perspective, complete information alone does not guarantee effective risk protection (Kunreuther, 1996). Moreover, certain risks – such as those associated with rare or systemic climate events – may be uninsurable because they are too costly for private markets. In such cases, government intervention becomes necessary to ensure universal access to affordable coverage. A well-designed mandatory insurance system can address these shortcomings by pooling risk across a wider group of participants and distributing costs more equitably (Colombo, 2001; Raschky et al., 2009).

Empirical evidence from Poland illustrates the implementation gap in mandatory crop insurance. According to the Supreme Audit Office (2020), only around 15–18% of agricultural producers complied with the legal requirement to insure at least half of their crops in 2017–2018, and penalties for noncompliance were virtually never enforced. A diagnostic survey confirmed that large farms reported full compliance, while medium-sized enterprises reached about 70%, small 60–70%, and micro-enterprises slightly below 90%. The lowest participation rates were found in the Podlaskie region (37%). These results reveal persistent institutional and enforcement barriers, including weak monitoring systems and low trust in regulatory authorities. Strengthening the framework of penalties and incentives remains essential for increasing compliance.

The pure market model of disaster insurance aims to minimise public spending by transferring risks entirely to private insurers. Yet, post-disaster financial aid remains a political reality. The Geneva Association (2018) argues that traditional public aid after disasters is inefficient and discourages proactive adaptation, while governments increasingly recognise the advantages of risk transfer to the insurance sector. Nevertheless, excessive subsidies can distort markets and weaken incentives for effective risk management.

Traditional insurance models relied on mutualisation, distributing high-risk costs across a larger pool of insured parties. In contrast, contemporary market-based insurance emphasises risk-reflective pricing, where premiums correspond directly to the level of individual risk (Thum, 2012). Proponents of this model claim that lower premiums incentivise risk reduction and discourage development in hazard-prone areas (Ben-Shahar & Logue, 2015; Botzen & Van den Bergh, 2009). However, risk-based pricing may also exacerbate social inequalities, as high-risk individuals face unaffordable premiums (Rees & Wambach, 2008).

In practice, the insurance industry operates primarily for profit, not for climate adaptation (Savitt, 2017). While competition enhances efficiency, it also introduces inequality in access to coverage. Governments may thus need to co-finance or subsidise insurance schemes to ensure inclusivity and prevent systemic collapse. In voluntary insurance systems, trust and solvency are crucial: policyholders must believe that insurers can meet their obligations after catastrophic events (McAneney et al., 2016).

Despite growing awareness, insurance markets remain imperfect (Stern, 2006). Underinsurance, limited product availability, and low public trust persist (Booth & Tranter, 2018). Moreover, political disputes and fragmented responsibilities hinder coherent adaptation strategies. Relying solely on private insurance and market mechanisms is unlikely to deliver equitable or socially acceptable outcomes (Adger et al., 2012).

Institutional economists emphasise that social cooperation and shared learning are essential for resilient adaptation. Social values – such as solidarity and fairness – often motivate adaptive behaviour more strongly than economic incentives (Evans et al., 2012; Lucas, 2018). Building collective capacity and strengthening the institutional environment of insurance are, therefore, key to making insurance an effective component of climate adaptation policy (Lehtonen & Liukko, 2011).

Discussion and Conclusions

The comparative analysis confirmed the research hypothesis formulated in the introduction: the imperfections of market mechanisms necessitate the establishment of institutional frameworks to support effective adaptation to climate change.

From the neoclassical perspective, adaptation is expected to emerge naturally through self-correcting market mechanisms. The inherent rationality of economic actors and the optimal allocation of resources are assumed to ensure efficient adaptation without the need for external intervention. In this view, the government's role is limited to facilitating market functioning – for instance, by providing information, securing property rights, and stimulating enterprises to undertake adaptation efforts when market incentives prove insufficient. Excessive ex post government aid, such as compensatory payments after climate-related losses, is regarded as counterproductive because it may weaken private incentives for precautionary behaviour and distort market signals.

By contrast, institutional economics argues that market mechanisms alone are insufficient to ensure equitable and effective adaptation. Their limitations stem from the absence of key normative features such as fairness, equality, and collective responsibility. In conditions of high uncertainty, bounded rationality, and asymmetric information, economic actors do not always act optimally, which often results in inefficient resource allocation and delayed adaptation.

Therefore, adaptation policies must be embedded within institutional structures that define clear rules, procedures, and accountability mechanisms. Institutions play a crucial role in coordinating actions, reducing uncertainty, and balancing efficiency with justice. Within this framework, insurance serves as an exemplary adaptation instrument – its effectiveness depends on appropriate institutional design, regulatory oversight, and public trust.

Consequently, the analysis supports the view that the establishment of mandatory climate-risk insurance, accompanied by robust monitoring and enforcement systems, represents a necessary institutional response to the limitations of purely market-based adaptation.

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DETERMINANTY ADAPTACJI PRZEDSIĘBIORSTW DO ZMIAN KLIMATU: PERSPEKTYWA PORÓWNAWCZA EKONOMII NEOKLASYCZNEJ I INSTYTUCJONALNEJ

STRESZCZENIE: Przedsiębiorstwa coraz częściej podejmują działania adaptacyjne w odpowiedzi na zmiany klimatu, aby ograniczyć ich negatywne skutki gospodarcze i środowiskowe. Jednak determinanty takiego zachowania adaptacyjnego pozostają wciąż niedostatecznie zbadane, zwłaszcza z perspektywy teorii ekonomii. Niniejsze opracowanie podejmuje próbę odpowiedzi na pytanie, jakie czynniki sprzyjają lub ograniczają podejmowanie decyzji adaptacyjnych przez przedsiębiorstwa, porównując zdolność wyjaśniającą ekonomii neoklasycznej i instytucjonalnej. W dalszej części analizie poddano kwestię, czy skuteczna adaptacja wymaga interwencji państwa, czy też mechanizmy rynkowe mogą funkcjonować autonomicznie, a także w jakim stopniu procesy adaptacyjne wymagają tworzenia określonych ram instytucjonalnych.

Artykuł wypełnia lukę badawczą poprzez integrację analizy teoretycznej z materiałem empirycznym pochodzącym z polskich przedsiębiorstw rolnych – jednego z sektorów najbardziej narażonych na ryzyko klimatyczne. W badaniu zastosowano podejście mieszane, łączące przegląd literatury, analizę porównawczą oraz sondaż diagnostyczny. Wyniki potwierdzają, że niedoskonałości mechanizmów rynkowych wymuszają tworzenie instytucji wspierających procesy adaptacyjne.

SŁOWA KLUCZOWE: polityka adaptacyjna, zmiana klimatu, zachowania adaptacyjne, ekonomia neoklasyczna, ekonomia instytucjonalna, ubezpieczenia obowiązkowe