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Role of Governance in Developing Disaster Resiliency and Its Impact on Economic Sustainability

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Abstract: This study explores the role played by governance in developing disaster resiliency and its impact on economic sustainability in Greece. Descriptive research was undertaken, and data were collected from 180 local governance leaders in Western Macedonia, Greece, to gain a deeper understanding of the role of governance in developing disaster resiliency and economic sustainability. The study confirmed the hypothesis that the focus of governance in developing disaster resiliency positively affects economic sustainability. The ability of governance to develop disaster resiliency and economic sustainability is mostly through leadership, engaging civil society, and international cooperation. These roles played by governance are also influenced by different political, economic, cultural, and social aspects, which all have an impact on the risk governance systems that cut across levels of resource assurance, technical support, and disaster risk management. Governance may have a significant impact on the overall design of rules and systems, including legislation, different decision-making procedures, and policy-implementation mechanisms, via political leadership. In terms of economics, the primary responsibility of governance is to support disaster risk-reduction systems. Governance must encourage risk awareness on a national basis through intensive disaster risk research, technological development, disaster-reduction education, and emergency response skills practice.

Keywords: disaster resiliency; economic sustainability; governance focus areas; disaster management; Greece

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1. Introduction

1.1. Background to the Problem

Europe is one of the areas most often impacted by natural catastrophes (D'Alfonso 2022). The poorest nations and people are harmed the most by these catastrophes. To ensure that no one is left behind, the 2030 Agenda for Sustainable Development aspires to include everyone (Benson 2016; Pal et al. 2021). Governance must make sure that national development plans are firmly rooted in catastrophe resilience if they are to safeguard their most vulnerable citizens (D'Alfonso 2022). Although there were fewer catastrophes in 2016 than in the past, they nevertheless had a significant impact: killing 4987 people, impacting 35 million people, and incurring an estimated USD 77 billion in damage. Flooding, which claimed 3250 lives, was the major cause of mortality. The number of fatalities since 1970 has varied greatly from year to year, averaging 43,000 per year, mostly due to earthquakes, storms, and floods. Since 1970, a person residing in Europe has had a five-fold higher risk of experiencing a natural catastrophe than someone living elsewhere, in addition to the deaths that have occurred. Large-scale damage can also be produced by disasters. Europe's

assets lost United States dollars (USD) 1.3 trillion in value between 1970 and 2016. Almost all of this was brought on by earthquakes, tsunamis, storms, droughts, and floods. Such harm has been increasing over time. This is partially due to the fact that more physical assets are at risk as Gross Domestic Product (GDP) rises (Ayyub et al. 2016). Disasters caused by numerous hazards, particularly those caused or exacerbated by climate change, are becoming more frequent and intense across the world. Public health crises induced by biological hazards, such as pandemics, epidemics, and bug infestations, are occurring at the same rate as COVID-19 (Dinan 2017; Glade et al. 2022). Unfortunately, catastrophes disproportionately affect a country's most disadvantaged inhabitants, who also face greater hurdles in implementing post-disaster assistance measures (Glade et al. 2022; Lopez et al. 2020, 2021; Zahran et al. 2008; Benevolenza and DeRigne 2019).

Disasters have an indirect impact on human health (both physical and emotional), placing a persistent strain on the healthcare system. Serious health issues often follow catastrophes, and the post-disaster demands for health restoration are significant. Minorities, the poor, and the elderly are more susceptible than others (Burger et al. 2017; Swerdel et al. 2016; Kessler et al. 2008; Price et al. 2013; Behr and Diaz 2013). Recent global shocks continue to test the scientific community and catastrophe risk assessment in the context of meteorological and geological events (Runkle et al. 2018; Hanson et al. 2011; Hallegatte et al. 2013; Nicholls et al. 2014; Horney et al. 2020).

However, according to a piece of research on the future effects from 2020 to 2030, most European nations at a greater risk would only achieve modest advancements in terms of lowering mortality or the number of afflicted individuals (D'Alfonso 2022). There have been initiatives to forecast future economic costs in addition to quantifying the human costs. These suggest that 40% of all disaster-related economic losses will occur in Europe, with the biggest economies suffering the most damage. However, as measured as a percentage of GDP, the burden is most likely to fall on the countries with special needs, especially tiny, developing island nations, which are predicted to lose an average of close to 4% of their GDPs annually. It is anticipated that the least-developed nations would see yearly losses of around 2.5% of GDP. Such estimations only take financial losses into account, not losses to people's socioeconomic well-being, which includes their health, education, and means of subsistence (Rose 2017). Losses to well-being resulting from catastrophes are often larger in the least-developed nations because poorer people, who have fewer resources and are living near to the poverty line, are unable to employ savings to deal with the effects and may need a longer time to recover and rebuild. Countries are susceptible to both natural catastrophes and man-made disasters as a result of wars and other violent conflicts (Kalogiannidis et al. 2022a).

The results of years of labor and investment by communities, governments, and development organizations may be destroyed by natural catastrophes. The Sustainable Development Goals of the 2030 Agenda place a strong emphasis on the notion of disaster resilience because of this. All new infrastructure must be able to endure major natural catastrophes in order to allow people to flee and survive, if these goals are to be met (Keating et al. 2017; Nathwani et al. 2019). However, the Sustainable Development Goals contain one more essential need. They must be accomplished for everyone, not simply the majority of people. To "leave no one behind" is the goal. This is especially important in terms of lowering catastrophe risk. Planning for resilience must be thorough and rigorous. Everyone likely to be impacted should have access to early warning systems. Even in the furthest reaches of the wilderness, access to food, water, and shelter should be quick (Ayyub et al. 2016; Tarhan et al. 2016). Thus, this study sought to assess the role of governance in developing disaster resiliency and economic sustainability.

1.2. Objectives of the Study

The major objective of this study was to assess the role of governance in developing disaster resiliency and economic sustainability. The specific objectives of this study included the following:

1. To establish the key focus areas of governance in developing disaster resiliency;
2. To explore the different aspects of economic sustainability in regard to disaster resiliency;
3. To establish different strategies for improved disaster resiliency.

1.3. Research Questions

- What are the key focus areas of governance in developing disaster resiliency?
- What are the different aspects of economic sustainability in regard to disaster resiliency?
- What are the strategies for improving disaster resiliency?

1.4. Research Hypotheses

H1. *A governance focus on developing disaster resiliency positively affects economic sustainability.*

H2. *There is a significant positive relationship between strategies for improved disaster resiliency and economic sustainability.*

1.5. Significance of the Study

The study's findings provide key insights into the importance of a governance focus on developing disaster resiliency that positively affects economic sustainability. Thus, new knowledge is generated about the concepts of disaster resiliency and governance efforts in disaster resilience as well as their influence on economic sustainability.

2. Literature Review

2.1. Theoretical Review

Although the term "resilience" has been used in the literature since the 1960s, its theoretical underpinnings are still being developed. This flexible phrase, which may be used in a variety of settings and conveys a variety of meanings, is connected to research on the dynamics of complex systems (Pal et al. 2021). The phrase has been utilized and accepted by the social sciences, including economics and urban and regional studies, despite its roots in the environmental and physical sciences (McNamara et al. 2020).

Since 2000, the phrase began to have particular significance; however, due to the use of many definitions, it began to grow more complexly, with the development of some ambiguities complicating the issue (Yu et al. 2023; Muñoz-Erickson et al. 2021). Natural catastrophes, urban planning, environmental management, engineering, social ecology, floods, and earthquakes have all utilized the word "resilience" (Quinlan et al. 2016; Vitale et al. 2020).

Despite the fact that numerous studies on the conceptual relevance of resilience have been published, a portion of its measurement has been mostly ignored. Two quantification strategies have prevailed; one uses numerous scales and complicated interactions inside the system, while the other, which occurs more often, employs indicators. Resilience is clearly a multifaceted dynamic process, not a static phenomenon (Yu et al. 2023; D. Liu et al. 2019; Wang et al. 2019; Koch et al. 2017).

Hazards, exposure, and vulnerability all combine to produce disaster risks. As with most words and phrases, various meanings may be found in the literature. To effectively analyze catastrophe risks, these circumstances must be modeled and put into a sustainable environment, which necessitates standardized and interoperable data at all levels (local, national, and global) (Fakhruddin et al. 2022; Liu and Chen 2021; Murnane et al. 2019).

In reality, the concept of resilience is widely used nowadays to investigate the dynamics of spatial economic systems and to debate how they react to shocks and disruptions from the economy. Resilience refers to a system's capacity to remain stable in the face of a variety of threats, including natural disasters, climate-related catastrophes, terrorist attacks, war, social unrest, and economic shocks. Such a multidimensional term cannot just be char-

acterized as the capacity for resistance or recovery by reverting to a prior equilibrium state, when seen from the viewpoint of complex adaptive systems. It also encompasses the ideas of re-orientation and renewal, which refer to a system's capacity for self-adaptation, reorganization, and modification of its development trajectory (UNESCAP 2018; Pal et al. 2021).

Consequently, resilience seems to be a desirable quality for any spatial system. The different characteristics of a system, such as the structure of the economy, social capital, and its governance, may provide evidence of resilience-related variables. As the structure of their interdependencies are dependent on the site itself and, thus, they foster unexpected dynamics, both empirical and theoretical research find it challenging to determine a large number of tangible and generally applicable/appropriate aspects of resilience. However, a significant number of studies on resilience supported the importance of variety as a sign of the diversity and redundancy of the system's components (the number and type of institutions, sectors, and firms), the presence of natural resource endowments, access to new knowledge, etc. (UNESCAP 2018). The intrinsic abilities of the system for adaptation and self-organization, including openness, social learning and memory, modularity and connection, institutional and organizational inertia and change, adaptive governance systems, etc., were also often discussed. Finally, although business networks, innovation systems, and entrepreneurialism are crucial to preserving competitiveness by providing breakthroughs and/or opening up to new markets, they may bode well in the development of other viable possibilities (Kalogiannidis et al. 2022b, 2022c).

2.2. Improving Resilience Frameworks

The concept of "resilience" has gained popularity in recent years due to different changes in the management strategies used to address the issues associated with disaster management. Resilience encompasses the different procedures or processes required to enhance the long-term coping abilities of communities under disaster management (Pal et al. 2021). This entails the capacity to withstand shocks while retaining the same functions and enabling growth at the same time. A system's resilience may be affected to some extent by adaptation, since it has the capacity to alter the elements and connections that make up the system (UNESCAP 2018). According to Zhang et al. (2021), the risks of hunger and malnutrition might possibly rise by up to 20% by the end of 2050 as a result of climate change effects. Much of the evidence included in their paper indicated a strong connection between the hazards brought on by the changing climate and hunger, which has an impact on food security. Future agriculture sector planning and investments must include disaster risk reduction (DRR) and resilience measures as a path ahead for national governance, especially those that are regularly hit by major catastrophes (Fox et al. 2019; Workman et al. 2018; Woodward and Samet 2017; Watts et al. 2018). Alternative approaches to achieving resilience in agriculture might include boosting yields using crops that can withstand stress, altering planting dates in accordance with seasonal predictions, improving water gathering and storage, and obtaining protective insurance programs for farmers. Regional trade systems and the lowering of food variability via food reserves are choices that trading nations may make (UNESCAP 2018). For instance, Bangladesh has made significant strides in achieving food security in the last 40 years despite its enormous population and ongoing vulnerability to hydro-meteorological threats (Gupta et al. 2020; Zhang et al. 2021).

Gupta et al. (2020) indicated that most countries have invested heavily in disaster management systems in order to improve community resilience, improve governance emergency response, and consequently implement early disaster warning systems. In Thailand, 2015–2016 saw one of the worst droughts, which caused a disaster crisis in the country. However, the consequences were greatly decreased because of the science-based, practical knowledge that came from satellite observations, and projections were made after data analysis. This forecast's accessibility helped farmers to be aware of the impending drought brought on by a lack of water (UNESCAP 2018). The majority of disasters that occur in an area transcend national borders. Flooding and droughts both have the same impact

of affecting river basins outside of national boundaries. For instance, the Tibetan Plateau and the Himalayas are the sources of many of the area's major rivers. If droughts or floods are occurring upriver, a sizable number of people who reside downstream and rely on the river for their livelihood are affected. This system's susceptibility is increased by its interconnection if a risk manifests in one area (UNESCAP 2018).

Additionally, actions have been taken at the regional level to strengthen or improve disaster-resilience frameworks. For example, in 2015, there was a collaboration between the Regional Integrated Multi-Hazard Early Warning System (RIMES) and UNESCAP to create a study on the forecast of the effects of the 2015–2016 El Nino. Along with forecasts of each country's risks, the study included sector-specific risk profiles at the national and regional levels. Forecasts regarding the impact of El Nino hazards on Pacific Island Countries were also made possible by this. Several of these initiatives made use of weather indicators and satellite technologies (Keating et al. 2017; Tarhan et al. 2016). The advancement of research and technology has made predictions with a 5-to-8-day lead time possible for river basins that traverse international boundaries. Despite this, most towns only receive a one-day warning before an evacuation. Therefore, in cooperation with UNESCAP, RIMES created a program that encouraged using a real-time satellite feed as well as flood modeling to extend the lead time for early flood warnings and enhance the methods of providing end users with early warning information (UNESCAP 2018).

2.3. Key Focus Area of Governance in Disaster Resiliency

Governance has a variety of responsibilities when it comes to running public affairs under various systems based on economics or politics. However, government in both countries with a capitalist market economy and a federal structure, such as the United States of America, and countries with a socialist market economy and a strong central government, such as Greece, play a substantial role in catastrophe risk governance. Governance's role in disaster resiliency varies depending on the stage of disaster management. In managing catastrophe risk, government must be accountable for the welfare of all citizens, just as everyone is equal according to the law. In an era of technological advancement, government must take the lead in disaster resiliency; this duty is a component of the authority that the public has entrusted to government (UNESCAP 2018; Thomas 2017).

In terms of politics, government has to ensure that there is proper development of the overall disaster system, there are processes for establishing and enforcing policy, and there are laws governing integrated disaster risk management. Greece, as a nation with a variety of natural disasters and significant disaster scenarios, has given careful consideration to its laws dealing with the handling of various natural catastrophes. Greece has developed a number of integrated disaster risk management measures under several laws. A comprehensive set of rules and regulations have been formed, particularly in relation to disaster relief and emergency management, reflecting the important role played by governance at all levels (Rose 2017). Greece's emergency response laws mandate that its government create a system for managing emergencies that is primarily distinguished by a unified leadership and all-encompassing coordination, which categorizes control, assigns responsibility at various levels, and provides geographical jurisdiction. This is because of how the emergency management system was designed. The state creates an efficient system for social mobilization, raises the level of public security and risk prevention awareness among all people, and contributes to the improvement of society's overall capacity for risk avoidance and support (Mavlyanova et al. 2021). County-level government is in charge of the emergencies that occur within its own administrative areas; for emergencies that happen at a higher level, either the governance at that level, to which the governance agencies of the administrative areas are subordinate, takes charge, or the governance at that level for each of the various governance entities of the affected administrative units jointly assume responsibility (Pal et al. 2021; Zhang et al. 2021).

Increasing the societal knowledge of risk governance, increasing disaster-response capabilities, creating post-disaster self- and mutual-assistance organizations, and allowing

the full participation of volunteers are just a few approaches to strengthen the integrated governance of catastrophe risks, such as during the COVID-19 period (Altshuler and Schmidt 2021). Numerous and terrible tragedies in recent years have captured the attention of everyone on Earth. The development of a safety-conscious culture is highly valued by different international organizations. Many governments have placed a strong emphasis on raising public understanding of risk governance and catastrophe prevention and reduction (Ma et al. 2021).

Disaster-Reduction Diplomacy

A crucial political job is catastrophe-reduction diplomacy. The dependence between nations has significantly risen as a result of economic globalization, the growth of transnational industry, and the development and usage of the Internet. For a wide range of political, economic, cultural, and social reasons, terrorist organizations with a wide range of activities have developed. These cultural responses coexist with the onset of global climate change, as demonstrated by global warming, and the beginning of regional conflicts or wars. The effects of natural catastrophes are made worse by all of these changes (Khan et al. 2022). When a nation or region experiences a catastrophe, the repercussions quickly spread to the surrounding area and eventually the whole globe, making the crisis more broad and difficult to control (Thomas 2017).

Ayyub et al. (2016) noted that, as a component of global diplomacy, there is now a progressively rising recognition of the need for catastrophe-reduction diplomacy, which includes addressing climate change and taking action against terrorist groups. It is necessary to strengthen the political underpinnings of disaster-reduction diplomacy in different nations by trying to establish bilateral and multilateral trust mechanisms, while also giving bilateral agreements' open-market mechanisms, regional and international organizations, and the United Nations (UN) their proper importance in disaster reduction. These multifarious initiatives are grounded in humanist values and align with the strategic goal of advancing all humankind. According to these principles, the UN should serve as the main organization promoting the creation of a worldwide disaster-resiliency system. These initiatives work together to lessen or remove the political obstacles to expanding globally integrated catastrophe-prevention and -reduction programs. The implementation of deft and smart disaster-reduction diplomacy is given particular priority in the quest to create an international catastrophe-prevention and -response system (UNECE 2019).

2.4. Economic Sustainability through Disaster Resiliency

The Triple Dividend of Resilience, a paper by Tanner et al. (2015), focuses on the three factors that may help advancement toward development objectives via the many advantages of disaster risk management. These factors are preventing losses, which is the first dividend; maximizing economic potential, which is the second dividend; and producing development-related side effects, which is the third dividend (Xu and Zhang 2021; Lu et al. 2021). Investing in disaster risk management (DRM) may have a broad range of long-term and short-term advantages. It enables the options of loss mitigation, lifesaving, and community assistance to recover after a tragedy. A DRM system enables investment planning for the future that results in social, environmental, and economic benefits such as creating employment and improving infrastructure.

The first category of DRM measures focuses on the mitigation of possible losses:

- Reducing the number of impacted persons and saving lives;
- Lowering the direct losses to important infrastructure and other assets;
- Reducing financial and non-financial losses.

The first benefit is a decrease in losses. The three crucial areas of economic planning, infrastructure development, and early warning systems greatly aid disaster resiliency in loss reduction (Tanner et al. 2015). Depending on the severity of the catastrophe, infrastructure losses may result in company losses, which in turn affect people's ability to find work. For instance, the 2011 earthquake in Tohoku, Japan, led to a local decrease in the manufac-

ture of auto parts. Due to the lower exports of these commodities, which are used as parts for automobiles, Toyota's Indian subsidiary's output decreased. Businesses and sectors may experience a decline in income as a result of inadequate DRM practices affecting infrastructure. Sustainability is made possible by promoting best practices and putting resilience techniques into action (Keating et al. 2017; Vargas-Vargas and Meseguer-SantamarÃa 2010).

The second dividend is associated with the benefits from DRM measures that lessen the risks of maximizing economic potential, including these examples:

- Economic rewards from taking calculated risks such as business and innovation;
- Large investment in very important assets such as agriculture;
- Increasing planning timeframes (e.g., for building up savings);
- Land value increases after DRM investment.

The idea that DRM may open doors of opportunity for people, organizations, businesses, and the public sector is the emphasis of the second dividend. Ex ante DRM strengthening, for instance, helps poor rural people that depend on agriculture for revenue to earn more and, thereby, improve their living circumstances, according to studies on these families. Regardless of the field you operate in most often, whether it is risk-taking in business, investment, or agriculture, these four concepts are interconnected and have one trait: forward-looking planning that boosts resilience (Tanner et al. 2015).

The ultimate dividend's primary objective is to provide development co-benefits, which may be social, economic, or environmental. The effectiveness of a DRM design is greatly influenced by these co-benefits, which may take many different forms. Some of the advantages include economic co-benefits, such as flood protection supporting fisheries, and social co-benefits, such as increased social cohesion or transparency (Tanner et al. 2015).

Disaster resilience offers a wide range of advantages, some of which are unintended. Additionally, there are several instances that demonstrate how designing certain measures may assist improve disaster resilience while presenting development possibilities. These may be seen as connecting the disaster-resilience objectives by offering some of the services that are undersupplied, including transportation networks or public spaces in cities. Using a multifunctional design for disaster-resilience infrastructure is a concept that is now gaining popularity (Ma et al. 2021). The pursuit of co-benefits based on ecosystems has also been pursued, which demonstrates the link that arises from having a reliable environmental system to decrease possible risks and, eventually, decreasing the different damages that may have been sustained (Table 1); this has drawn attention throughout time. In the absence of catastrophes, ecosystem protection may also result in additional advantages including biodiversity preservation, carbon sequestration and mitigation, and environmental conservation (Tuhkanen et al. 2020; Zhang et al. 2021), all of which are provided to us through ecosystem services (Kalfas et al. 2021, 2019, 2022).

Investments in disaster resilience provide additional advantages that are related to the transportation system. Flood embankments support road infrastructure in addition to protecting property from harm. This makes road infrastructure flood-resistant, enabling mobility for the delivery of essential supplies and equipment in the wake of a disaster (Tarhan et al. 2016).

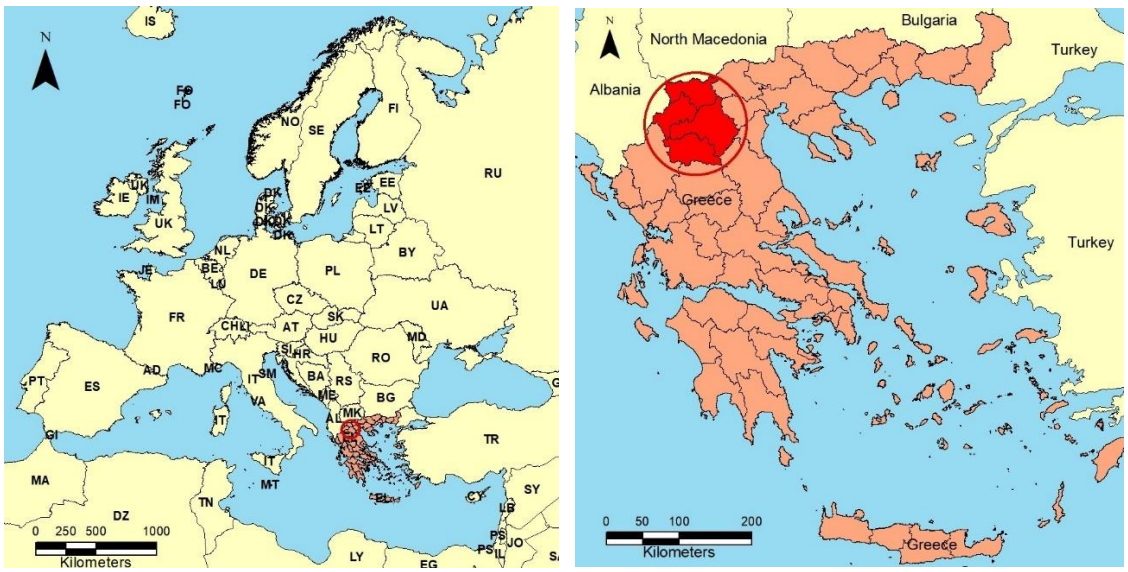
Table 1. Benefits associated with disaster resiliency.

Disaster Management and Resilience Activity	Benefits
Structures for food security	Provision of portable water and hydroelectric power as well as dual-purpose road infrastructure
Strengthening disaster management capacity of civil society	Improved governance and more organized social structures
Ecosystem-based disaster management techniques	Environment protection or conservation, improved air quality, and climate change mitigation
Improving water supply systems in rural areas	Regardless of whether a calamity occurs, improved water supply systems
Building and using drainage canals, water storage reservoirs, and pipelines	Enhanced irrigation techniques, possibly improved farming techniques, and infrastructure for a parking lot or road tunnel that serves two purposes
Installing reliable wireless communications	Improved telephone and computerized dialing services access

Source: Authors' own work (2022).

2.5. Western Macedonia and Its Historical View of Disaster Resiliency

One of the 13 self-governing regions in the country, Western Macedonia is made up of the regional units of Florina, Grevena, Kastoria, and Kozani (the capital). It is a remote, hilly, landlocked territory in Greece's northwestern boundaries that is far from the two major cities of Athens and Thessaloniki as well as the nation's "conventional" growth axis (Figure 1). The development of the Egnatia Motorway and some of its vertical axis has substantially alleviated the region's lack of suitable transportation infrastructure, which was another feature of Western Macedonia until recently. The area has Greece's lowest population density, and although producing just 2.5% of the country's GDP, it is the fourth-highest-producing region in terms of wealth per resident in Greece (Vardakoulias 2020).



Europe Western Macedonia, Greece—study area

Figure 1. Maps of Europe and Greece.

A devastating earthquake struck the regional units of Grevena and Kozani in 1995. Several nearby small towns were impacted by the earthquake. In the regional units of Grevena and Kozani, more than 2500 and 7500 structures, respectively, fell or suffered significant damage. As a result, a significant portion of the population was steered away

from the mountainous regions and into the main metropolitan centers. The Restoration Fund for Earthquake Victims was a direct public aid program for the restoration of buildings damaged by the earthquake. The Integrated Program of Reconstruction was a public investment program for the reconstruction of the area that had an immediate and significant impact on the regional GDP and employment. Although monies were subsequently claimed and given to the other units in the region as a consequence of local pressure on the central government, these programs were initially created and executed to benefit just the earthquake-affected districts of Grevena and Kozani (Vardakoulias 2020).

In general, Greece has a high seismic risk owing to its geotectonic location in the Eastern Mediterranean Sea, and it often experiences catastrophic earthquakes with building damage and property losses as well as substantial environmental repercussions (Mavroulis et al. 2022; Kappos et al. 2010).

Western Macedonia was shown to be very susceptible during the 2008–2009 crisis. The effects of the two interconnected crises, the financial and banking crisis and the public sector debt crisis, were felt throughout the area for more than seven years. The most obvious indicators were the decline in GDP, rising unemployment rates, salary reductions, business closures, and the public sector's withdrawal from providing certain social services (Marto et al. 2017). One of the four Greek areas most badly affected by the crisis was Western Macedonia, which had the highest unemployment rate in the nation in 2015 (28.5%) and the third-worst percentage among the 270 Nomenclature of territorial units for statistics—second level (NUTS 2) regions in the European Union (EU27). Despite its efforts and national advancements, Western Macedonia still does not appear to be able to resume its development trajectory (IFRC 2022). Given the above, policy makers and local and regional stakeholders are widely concerned about whether the policies being chosen are the most suitable ones, particularly in light of Greece's highly centralized governance structure and the limited engagement of regional and local players. Given the significant changes in the governance structure at lower levels of public administration and the difficulties created by the conditions established for the new programming period, this subject has become even more important for resilience.

2.6. Research Gap

The different studies reviewed in the literature show that most countries across Europe are believed to suffer from heat, storms, and flooding as well as long-term dangers such as sea-level rise and drought (Sheehan et al. 2022; Edney et al. 2022). The studies also show that most government leaders and place-specific decision-makers (the local government) are more aware of local adaptation strategies that can be used to enhance disaster resilience. The studies show that local governments are often in charge of the critical services that impact the well-being of the community, such as public health (medical facilities, immunizations, hospitals, etc.) (Sheehan et al. 2022; Woodhall et al. 2021). However, there are conceptual gaps regarding the relationship between government efforts in disaster resilience on economic sustainability. Therefore, this study focused on establishing the role played by governance on disaster resilience and how this impacts the level of economic sustainability.

3. Methodology

3.1. Research Design

The study utilized a descriptive research design, whereby quantitative tools were used to collect data associated with the role of governance in developing disaster resiliency and economic sustainability. This research design was basically an inquiry in which quantitative data were collected and consequently evaluated to clearly understand the research problem in terms of current trends and connections or relationships between the study variables. The descriptive research design helped to generalize the study findings about the role of governance in developing disaster resiliency and economic sustainability.

3.2. Target Population and Sample Size

The study targeted the different accessible local governance leaders in Western Macedonia, Greece. The population was used to establish the most appropriate sample for the study.

The study utilized a primary sample of 180 study participants who were local governance leaders in Western Macedonia, Greece. Twelve local city councils (330 persons), a regional prefecture council (41 persons), technical services from municipalities, regional and decentralized administration authorities, the fire department, the police, volunteer organizations of civil protection, the Red Cross, the Greek highway administration, the public electricity company, and a university were represented among the local governance leaders who attended the questionnaire (more than 1100 persons).

After evaluating the survey's accuracy (EUR 30.74) and reliability (P = 99.7%), the sample size was chosen. The variance of the weekly payment for fuel (movements), just for work, was calculated using a preliminary sample (or pilot sampling) of 50 persons. S^2 = 5365.28 and s = 73.25 were the results. The degree of dependability (P) required determines the value of z; when utilizing the sample size calculation, a value of z = 3 is often utilized, which equates to a level of dependability of P = 99.7%. Equation (1) calculates that the minimal sample size should be 179.87, or 180 people, using our values of N = 1500 (population of respondents), s = 73.25 (standard deviation of the sample), z = 3 (value that equates to a level of dependability P = 99.7%), and d = 15.37 (the needed precision d was arbitrarily selected and represents half the confidence interval) (Kalfas et al. 2020; Kalogiannidis et al. 2022d, 2022e).

$$n = \frac{N(zs)^2}{Nd^2 + (zs)^2} \quad (1)$$

Calculation of the minimum sample of respondents

$$n = \frac{1500(3 * 73.25)^2}{1500 * 15.37^2 + (3 * 73.25)^2} \Leftrightarrow n = 179.87$$

where

n is the minimum sample of respondents;
d is the needed precision;
N is the total population;
s is the population proportion; and
z is the critical value.

A purposive sampling technique was used to select the representative sample for the study.

3.3. Data Collection

An online questionnaire was used to collect data from the selected target population in Western Macedonia, Greece. One of the simplest and most popular methods for collecting data is via a survey questionnaire. This is because it is less expensive than other methods since a large number of respondents are surveyed quickly, and it allows respondents to openly express their opinions on delicate subjects without worrying about the researcher's approval or disapproval. An online survey questionnaire was used to gain insight into the role of governance in developing disaster resiliency and economic sustainability. The study was carried out between 18 September and 4 October 2022. Table 2 shows variables, guiding questions, measurements, and expected signs.

Table 2. Variables, guiding questions, measurements, and expected signs.

Variable	Description	Measurement	A Priori Expectation
Dependent variable			
Economic sustainability	What are the different aspects of economic sustainability in regard to disaster resiliency?	1. Education on disaster resiliency 2. Establishing disaster warning systems 3. Increasing capacity of internationally based disaster relief and assistance 4. Disaster-reduction diplomacy	+/-
Independent variables			
Strategies for improved disaster resiliency	What are the strategies for improved disaster resiliency?	1. Governance support 2. Public involvement 3. Favorable policies 4. Strong international relations	+/-
Key focus areas of governance	What are the key focus areas of governance in developing disaster resiliency?	1. Long-term economic growth 2. Environmental conservation 3. Improved standards of living	+/-

Source: Authors' own work (2022).

3.4. Data Analysis

The quantitative data gathered from the chosen investors and municipal officials in Western Macedonia, Greece, were coded before being imported into SPSS for analysis. The findings were tabulated, and frequencies and percentages were used to analyze them. A single variable was studied in univariate research, and interpretation was based on the frequencies and percentages that were found. Through the application of the chi-square in bivariate analysis, the relationship between the numerous study variables was determined. Chi-square was used to test the hypothesis using Equation (2).

$$X^2 = \frac{\sum(\text{Sum of } (\text{Observed} - \text{Expected})^2}{\text{Expected}} \quad (2)$$

Testing hypothesis with chi-square.

The acquired chi-square values and *p*-values, which served as the foundation for rejecting or accepting the null hypothesis at the 0.05 critical value, were used to interpret the findings of the chi-square analysis.

Regression analysis was also conducted to find out the extent to which governance in developing disaster resiliency predicts economic sustainability. The multiple regression model in Equation (3) served as the guide for obtaining the different regression coefficients.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon \quad (3)$$

where

Y = economic sustainability;
β_0 = constant (coefficient of intercept);
X_1 = key focus areas of government in disaster resiliency;
X_2 = strategies for improved disaster resiliency;
ε = the representation of the error term that could be present in the model of regression in Equation (3).

The formulated research hypotheses (H1 and H2) of this study were successfully tested at a 95% confidence interval or 5% (0.05) significance level.

3.5. Ethical Considerations

In order to check the desire of local governance executives and leaders in Western Macedonia, Greece, to engage in the study, we made sure that informed permission was gained. Along with doing this, a high level of confidentiality and privacy was upheld when working with research participants' data. Last but not least, the respondents were allowed to interpret the various opinion questions in order to react to inquiries. This aided in gaining comprehensive responses to specific questions about governance's role in fostering economic sustainability and catastrophe resilience.

4. Results

This section presents the different results obtained after an analysis using the Statistical Package for the Social Sciences (SPSS).

4.1. Univariate Analysis

The majority of the participants (60%) were male, while 40% were female. Concerning the age bracket of the respondents, the majority (38.3%) were 31–40 years, while the least number of participants (11.1%) were above 50 years. The majority of the study participants (50%) had a bachelor's degree, and only 10.6% had a Ph.D. (Table 3).

Table 3. Showing demographic data of participants.

Characteristics	Frequency	Percentage (%)
Sex		
Male	108	60.0
Female	72	40.0
Education level		
Diploma	31	17.2
Bachelor's	90	50.0
Master's	40	22.2
Ph.D.	19	10.6
Age bracket		
Below 30 years	32	17.8
31–40 years	69	38.3
41–50 years	59	32.8
Above 50 years	20	11.1
Total	180	100

Source: Authors' own work (2022).

4.2. Descriptive Statistics

The study established the key focus areas of governance in developing disaster resiliency, and the results are presented in Figure 2.

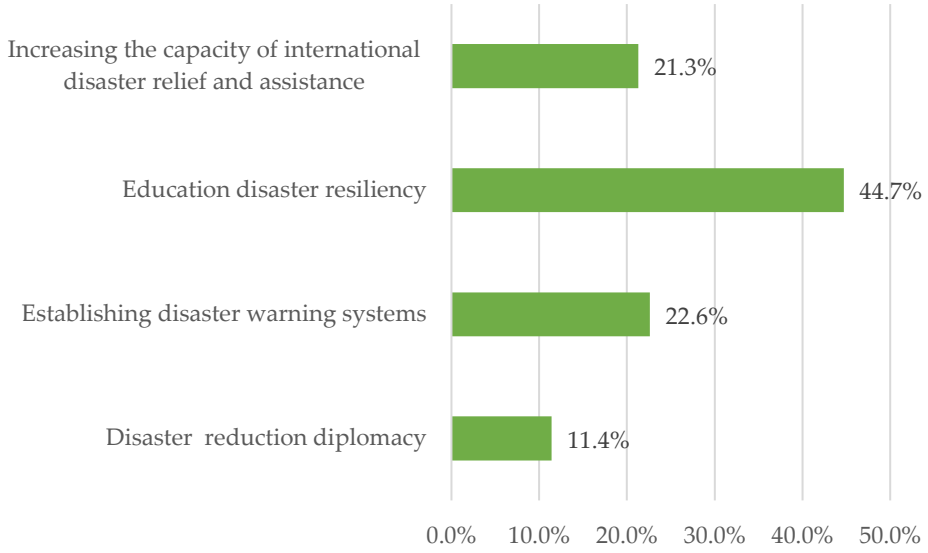


Figure 2. Key focus areas of governance in developing disaster resiliency. Source: Authors' own work (2022).

The majority of the study participants (44.7%) identified education on disaster resiliency as the key focus area of governance in developing disaster resiliency, followed by establishing disaster warning systems (22.6%), improving the capacity of internationally based disaster relief or assistance (21.3%), and 11.4% of the participants identified disaster-reduction diplomacy as a key focus area of governance in developing disaster resiliency.

The study further focused on establishing the opinions of respondents concerning the strategies for improved disaster resiliency, and the results are presented in Figure 3.

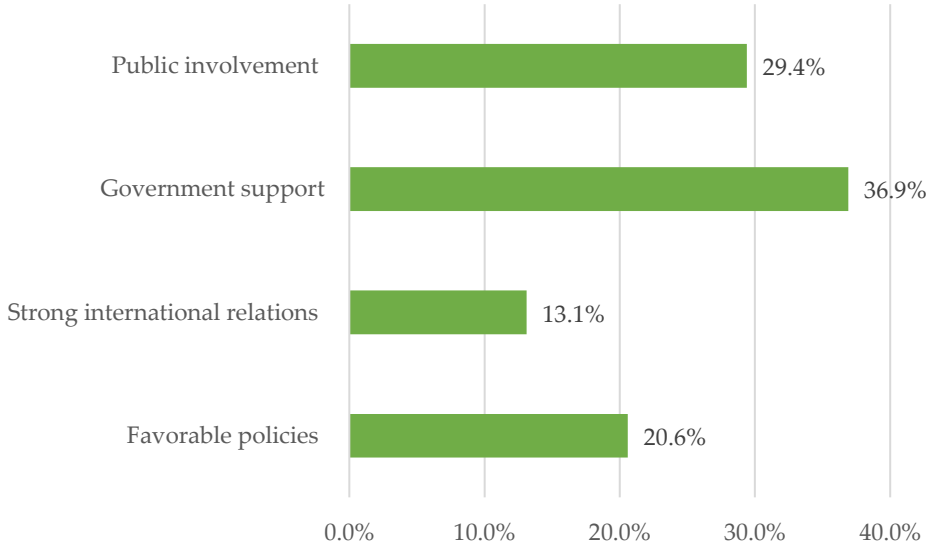


Figure 3. Strategies for improved disaster resiliency. Source: Authors' own work (2022).

The majority of the participants (36.9%) identified governance support as the key strategy to improved civil protection, followed by public involvement (29.4%) and favorable policies (20.6%), while only 13.1% indicated that strong international relations are a suitable strategy to improve civil protection.

The study also sought to identify the key aspects of economic sustainability, and the results are presented in Figure 4.

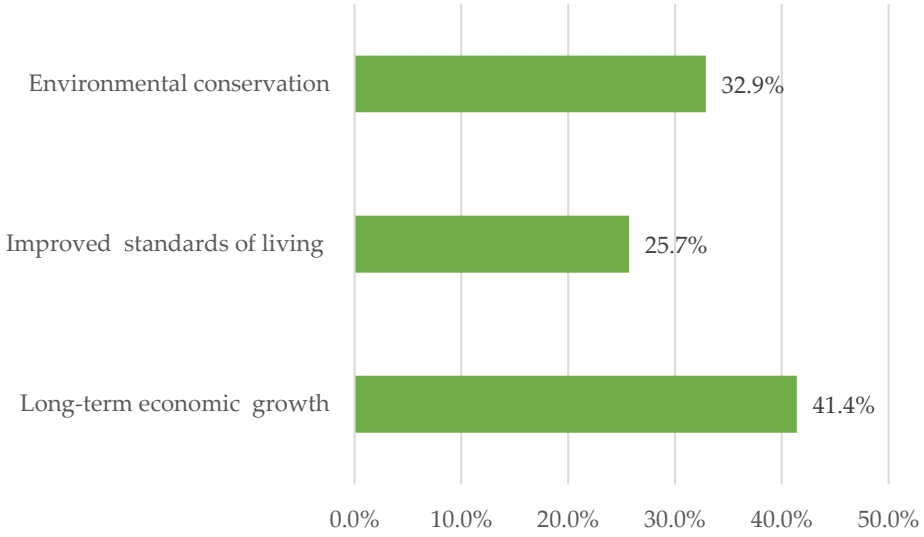


Figure 4. Key aspects of economic sustainability. Source: Authors' own work (2022).

The majority of the participants (41.4%) indicated that long-term economic growth is the key aspect of economic sustainability, followed by environmental conservation (32.9%) and then improved standards of living (25.7%).

4.3. Chi-Square Analysis

A chi-square analysis helped to establish the relationship between the independent variable and the dependent variable of the study (economic sustainability), as presented in Table 4.

Table 4. Cross-tabulation of key focus areas of governance in developing disaster resiliency and economic sustainability.

Economic Sustainability	Key Focus Areas of Governance in Developing Disaster Resiliency				Total
	Establishing Disaster Warning Systems	Developing Disaster Resiliency	Education on Disaster Resiliency	Increasing Capacity of International Disaster Relief and Assistance	
Environmental conservation	12	9	14	24	59
Improved standards of living	16	11	10	9	46
Long-term economic growth	13	1	56	5	75
Total	41	21	80	38	180
$x^2 = 11.358$	df = 3	$p = 0.026$		$\alpha = 0.05$	

Source: Authors' own work (2022).

Since the computed $x^2 = 11.358$ is greater than the tabulated = 3.742, and $p = 0.026 < 0.05$, we, therefore, conclude that the government's focus on developing disaster resiliency positively affects economic sustainability.

A chi-square analysis helped to establish the relationship between the independent variable and the dependent variable of the study (economic sustainability), as presented in Table 5.

Table 5. Cross-tabulation strategies for improved disaster resiliency and economic sustainability.

Economic Sustainability	Strategies for Improved Disaster Resiliency				Total
	Public Involvement	Governance Support	Strong International Relations	Favorable Policies	
Environmental conservation	17	21	10	11	59
Improved standards of living	15	12	7	12	46
Long-term economic growth	21	33	7	14	75
Total	53	66	24	37	180
$x^2 = 9.1642$	df = 3	$p = 0.002$		$\alpha = 0.05$	

Source: Authors' own work (2022).

Since the computed $x^2 = 9.1642$ is greater than the tabulated $x^2 = 3.841$, and $p = 0.002 < 0.05$, we accept hypothesis H2, which states that there is a significant and positive relationship between the strategies for improved disaster resiliency and economic sustainability.

4.4. Regression Analysis

The extent to which governance in developing disaster resiliency predicts economic sustainability was established using regression analysis, as presented in Tables 6–8.

Table 6. Model summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.790 [a]	0.749	0.71	0.60214

[a] Predictors: (constant), key focus areas of governance in disaster resiliency, and strategies for improved disaster resiliency.

Table 7. ANOVA.

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	76.204	2	28.031	68.421	0.015
Residual	71.051	178	0.413		
Total	147.255	180			

Dependent variable: economic sustainability; Predictors: (constant), key focus areas of governance in disaster resiliency, and strategies for improved disaster resiliency

Table 8. Coefficients.

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	0.588	0.126		1.941	0.210
Key focus areas of governance in disaster resiliency	0.168	0.054	0.371	1.124	0.016
Strategies for improved disaster resiliency	0.042	0.072	0.062	0.817	0.011

Dependent variable: economic sustainability.

The dependent variable is economic sustainability. The independent variable was regressed along with the dependent variable or economic sustainability, which provided an R^2 value of 0.749. This is an implication that the independent variables of this study all together explain 74.9% of the variation in the dependent variable (economic sustainability). The regression results also confirm that the study's independent variables do not influence 25.1% of the changes in economic sustainability.

The F-statistic of 68.421 at prob. (Sig) = 0.015, conducted at a 5% level of significance, means that there is a statistically significant linear relationship between the independent variables and the dependent variable (economic sustainability) as a whole.

The results in Table 8 show that governance in developing disaster resiliency significantly predicts economic sustainability since $p < 0.05$.

Hypotheses Testing

In regard to the first coefficient of the regression model (since the level of significance of 0.016 is less than 0.05%), we confirmed that the key focus areas of governance in disaster resiliency positively influence the sustainability of a country's economy. Therefore, we accept hypothesis H1 and conclude that a governance focus on developing disaster resiliency positively affects economic sustainability.

Moreover, the regression's second coefficient shows that the different strategies for improved disaster resiliency have a positive and significant influence on economic sustainability since the significance level of 0.011 is less than 0.05%, and H2 was accepted, meaning there is a significant and positive relationship between the strategies for improved disaster resiliency and economic sustainability.

5. Discussion

The study established the role of governance in developing disaster resiliency and economic sustainability in Greece. It was revealed that a governance focus on developing disaster resiliency positively affects economic sustainability and that there is a significant and positive relationship between the strategies for improved disaster resiliency and economic sustainability. The regression results confirmed that a governance focus on developing disaster resiliency significantly predicts economic sustainability.

The study showed that the key focus areas of governance in disaster resiliency positively influence the sustainability of a country's economy. Education on disaster resiliency was identified as one of the key focus areas of governance in developing disaster resiliency in Greece. This is in addition to establishing disaster warning systems and enhancing disaster-reduction diplomacy toward developing disaster resilience. Disasters may negatively impact livelihoods in the majority of nations, further disadvantaging those who are already in a precarious position. Most people in the world are probably reliant on agriculture and fragile ecosystems and, therefore, have less capacity for adaptation and recovery (UNESCAP 2018; Keating et al. 2017; Marto et al. 2017). They generally live in low-value areas of cities that are vulnerable to dangers such as landslides and floods. Women and girls make up a large share of the victims, and they often lack access to information, financial services, land and property rights, healthcare, and education. Plus, there are other structural disadvantages that weaken their resistance (Gupta et al. 2020).

It was revealed, per the regression results, that different strategies for improved disaster resiliency have a positive and significant influence on economic sustainability. It is, therefore, crucial to have a system of financial guarantees for disasters since this helps in putting forward effective disaster-response mechanisms. The adoption of catastrophe insurance, disaster bonds, and a catastrophe lottery with governance assistance has been properly demonstrated via catastrophe finance in several nations (Suleimany et al. 2022). Establishing a catastrophic financial-guarantee system and strengthening governance assistance via fiscal policies, taxes, credit, and guarantees are urgently needed to enable the businesses that manage disaster-mitigation goods to cover costs, turn a profit, and be ready for future disasters (ILO 2020; Adrián and Peralta 2020). The domestic guarantees system's robustness against catastrophic systemic effects would be considerably improved by its connectivity to global financial services, including the capital market, multinational insurers, and cat-bond issuers. These resources will help governance and companies work together to overcome disaster risks globally.

The results show that disasters have an indirect impact on human health (both physical and emotional), placing a persistent strain on the healthcare system. Serious health

issues often follow catastrophes, and the post-disaster demands for health restoration are significant. Minorities, the poor, and the elderly are more susceptible than others (Burger et al. 2017; Swerdel et al. 2016). The recent global shocks continue to test the scientific community and catastrophe risk assessment in the context of meteorological and geological events (Runkle et al. 2018; Horney et al. 2020). The study findings also show that disasters such as earthquakes and floods may affect the country's economic progress. Relatedly, Rose (2017) revealed that the economic burden of countries hit by disasters such as floods is most likely to fall on countries with special needs, especially tiny, developing island nations, which are predicted to lose an average of close to 4% of their GDP annually. It is anticipated that the least-developed nations would see yearly losses of around 2.5% of GDP. Such estimations only take financial losses into account, not the losses to people's socioeconomic well-being, which include their health, education, and means of subsistence (Rose 2017). Economic logic may be found in spending money on catastrophe preparation and prevention (Huseynov 2019). The advantages of making investments to reduce the hazards of floods, earthquakes, and wildfires may sometimes be 2 to 10 times more than the expenses. There is a chance to pursue a greener, more resilient, and more inclusive development path as the globe begins to recover from the pandemic's effects. This may be accomplished by enhancing financial security, making investments in risk mitigation, and enhancing institutional readiness (Boone and Pinaudnce 2021; Pal et al. 2021). There are still issues that need attention. While some nations are making progress toward the 2030 objective, others are finding it difficult to deal with the obstacles that have kept them from catching up. The support given to these nations by the region as a whole to make sure that no person is left behind paves the path ahead for the future. The regional platforms that are accessible need to provide a level playing field for all states, regardless of their size, economic standing, or capabilities. Cooperation and burden sharing among the area's nations increase catastrophe resilience, which may build on the numerous success stories that have emerged from this dynamic region and lead to advancement toward economic development (Tarhan et al. 2016). In terms of society, governance helps to establish integrated management systems for disaster risk reduction and emergency management. It is the responsibility of governance to work in partnership with civil society. In terms of economics, governance is in charge of fusing resources from both the governance itself and the community. Dominant and minority cultures' cultural needs must be handled equally by governance (Ranjbari et al. 2021). Governance's function in society is to coordinate the activities of social classes that are wealthy and impoverished. To increase the capability for international disaster relief and support, volunteer services, and a culture of global safety, governance has a political, economic, cultural, technical, and social duty. It must take political action to reduce disasters. Economically, the disaster financial-assurance system must be strengthened.

6. Conclusions

This study explained the role played by governance in disaster resilience and economic sustainability based on the practices of Europe and Greece in particular. Measures for increased disaster resilience have a substantial positive effect on economic sustainability, and a governance emphasis on creating disaster resiliency favorably influences economic sustainability. The regression findings showed that economic sustainability is substantially predicted by governance in the development of catastrophe resilience. Our research demonstrated how important government priorities for catastrophe resilience have a favorable impact on the viability of a nation's economy. One of the main governance priority areas for fostering catastrophe resilience in Greece was education. This study showed that governance improves its own roles in disaster risk governance and advances the well-being of society by leading, planning, promoting, and strengthening catastrophe resilience in political, economic, and cultural areas as well as socioeconomic development. Additionally, it improves the effectiveness and advantages of resource utilization for disaster resilience and contributes to and integrates the effects of disaster resilience on economic sustain-

ability. Governance promotes disaster-resilience education and research, implements a catastrophic financial-guarantee scheme, and participates in disaster-reduction diplomacy. Governance contributes to international humanitarian efforts in crisis circumstances by expanding the capability of disaster assistance. Chinese disaster risk governance continues to be primarily shaped by the government and relies heavily on state-centric strategies to manage catastrophe risks. Governance involvement in catastrophe resilience is not the only option. By fulfilling its leading and international humanitarian roles in regard to the disaster-resilience system, governance is only able to enhance the structure and functions of disaster resilience and maximize the efficiency and benefits of using the available resources for disaster reduction. Governance must also acknowledge the significance of private industry, local communities, and the general populace in catastrophe risk reduction. The abundant literature and lessons learned from the successful and unsuccessful implementation in countries in Europe, and Greece in particular, show that there are numerous opportunities to investigate the actions that need to be taken to increase resilience and work toward achieving the Sustainable Development Goals. Disaster resilience should be a top concern for every governance since the risks associated with disasters make it difficult to achieve goals for economic sustainability.

6.1. Recommendations—Practical Implications

The following are the recommendations based on the different study findings.

It is important for governance to put much emphasis on the key areas that enhance disaster resilience. Areas such as public awareness, education on disaster resilience, and national disaster warning systems should be given much attention by governance.

Increasing the general capacity of disaster relief and assistance is one key strategy for improved disaster resilience. Therefore, it is important for governance to focus on increasing the capacity of international disaster relief and assistance, to enhance resilience in the general public and consequently achieve economic sustainability.

6.2. Limitations and Areas for Future Research

The study focused on English-language articles, so any claim about the role of governance in the development of disaster resilience and economic sustainability can be considered incorrect. The limitations of the study may include the remote completion of the questionnaire, which certainly cannot replace face-to-face communication.

The study focused on the role of governance in developing disaster resiliency and economic sustainability. Limited attention was directed to the factors that influence governance's ability to enhance disaster resilience and economic sustainability; hence, future research should focus on this insight.

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