

# ENVIRONMENTAL RISKS AND REGIONAL COMPETITIVENESS: BRIDGING THE CONCEPTUAL GAP

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**Abstract.** *Given the controversial discourse characterising competitiveness, the article aims to present a different perspective regarding the quantification of regional performances. The challenge addressed here is that of a too extensive conceptual background that although characterised by pluri-perspectivism in approached, it is still not providing consistent evidence to define a clear connection between competitiveness levels and risk factors. Existing literature focuses on presenting complicated taxonomies for environmental risks, mitigation mechanisms partly addressing the worrisome trends of resource depletion and ecosystem erosion. In search for a method to include a new set of risk factors and in an attempt to identify which of those account for the economic stagnation or decline of a region in terms of competitiveness level, a conceptual clarification is needed. After reflecting on the existing perspectives in the field, a couple of prerequisites for a conceptual framework are provided, positing that environmental risk for the business level can be better understood conceptually at firm level and approached for operational purposes on a regional level. The study henceforth coagulates the conceptual links between environmental risks [ER] and the overall level of regional competitiveness providing insight on the corporate strategy dimensionality of sustainability and productive dependence. Subsequently, on one hand, it is possible to provide a set of key principles acting as building blocks for assessment purposes and on the other, to present an alternative conceptual construct.*

**Key words.** environmental risks; regional performance; competitiveness; operational; mitigation.

**JEL classification.** R11; R12; R58.

## 1. Introduction

With much information available nowadays on aspects regarding economic activities and social systems, the environmental phenomena occurring due to these processes is still an elusive subject. Specifically, the causal links and pressure-response mechanisms are, in many cases, too intertwined to be clearly differentiated. This aspect is also the key note in which the matter of environmental risk should be regarded as throughout the literature several standpoints are emerging in an attempt to define it. Within this understanding, environmental risks [ER] are the array of conditions and phenomena that may have a detrimental role on the socio-economic dimension in terms of activity, performance and security. Environmental change is, in this regard, a prominent risk for both business environment and the population (Claussen and McNeilly, 1998; Low and Gleeson, 1998). Initial evidence lead to the conclusion that the origin of this change is buried deep within current societal and economic practices, so mitigation in this area requires identification of the triggering factors and the vulnerability points (Kaspersen *et al.*, 2000). For policy makers and environmental scientists, these considerations are fuelling the development of climate-impact and hazard models out of which, Regional Climate Models (RCM), Global Circulation Models (GCM), and Hydrological Models (HBV, SWIM and VIC)

are only very few of the most prominent (Lung *et al.*, 2013; Provenzale, 2014; Vetter *et al.*, 2014).

The general acknowledgement is that, usually, these models are particularly well designed in portraying a set of causal relationships between the characteristics of the social and technological development and the impact on ecosystems and natural habitats. In addition, this link emphasises on the overall effect on societal vulnerability increase which more often leads to further threats for the local population. Using such complex models yields good results across various implementation environments, fitting the goal of presenting the causality chain for further use in policy making; the same constructs are offering a broad understanding of the forces that drive this process (Kaspersen *et al.*, 2000, p. 10).

For the business environment, a slightly different approach is adopted. Addressing risks coming from the environment and deploying mitigation actions to limit the impact on natural elements is a central concern of industry-linked firms. Empiric evidence is provided to argument favourable outcomes of successful implementation of corporate risk management measures, in response to moderate levels of ER (Dobler *et al.*, 2014). Opposingly, very few research strands capture the dimension of risk management and environmental risk in an attempt to portray how different activities affect and are affected by elements originating in the natural environment.

Attempting to find out how ER and competitiveness aspects are connected and which risk types are more prominent at a regional level (and for which economic entities), the paper will reflect on the accuracy of the existing perspectives in the field, aiming to provide the guidelines for a framework to better address the issue of vague conceptual delimitation. Contextually, the issue of environmental risks is evaluated by focusing on the cumulative aspects arising from firm level processes. In other words, the article tackles with how environmental risk is affecting different types of companies within regions.

Following the introductory part, the second chapter presents an overview on the conceptual background constructing the topic or regional competitiveness and environmental risk. Within this part an observation of existing research perspectives is constructed while positing that environmental risk for the business level can be better understood at firm level and approached for operational purposes on a regional level. In the third section, we present the set of prerequisites entailed in the creation of a new conceptual framework. This part implies the clarification of the mechanisms that link regional competitiveness and environmental risk. Within the fourth chapter a discussion is sparked on the topic of implementation premises. In this part, sustainability in economic activity is detailed, exemplifying the specific situations observed within the Center Region, Romania. After underlining the set of new possible research dimensions, the article ends with a set of concluding remarks.

## **2. Key conceptual considerations and hypothesis development**

Several aspects require careful consideration before launching into structuring the conceptual framework. The high level of complexity is picked up from the initial scientific contributions towards shaping the environmental risk taxonomy (Kaspersen *et al.*, 2000) and are continued in the more recent ones underlining the trends defining the economics of ER and environmental justice (Campbell Gemmill and Scott, 2013), addressing the origin of risk for the business environment (Dobler *et al.*, 2014) or elaborating on the subject of behavioural and environmental economics (Mackenzie and Wolfe, 2004; Croson and Treich, 2014).

### **2.1. The multiple dimensions of environmental risks**

The term 'risk' in the specific literature bears multiple faces, derivative from the initial representation as the probability and threat of negative occurrences caused by external or internal vulnerabilities. We are generally referring to a loop process entwining the natural and societal aspects into representing the impact of probable and possible events on the physical and socio-economic dimensions. ER are the set of conditions and events affecting specific systems, modelling their behaviour accordingly. Typically, two categories exist in this context and they are linked either to human activities or to the natural environment as sources of risk (Böhm and Pfister, 2005), all fuelled by the race towards fast and sustainable development in terms of change and structural modifications. Environmental risk refers to the cumulated effect of different sectorial conditions involving outdoor pollution, climate change (World Health Organisation [WHO], 2008) and natural hazard occurrence rate to name a few, that directly influence the productivity levels of territorially-dependent local businesses.

Risk factors, in this context are the broad array of elements, natural conditions and specific local situations that create a problematic environment for business localisation and growth, in alliance with the set of sequential threats for the population.

More recent studies support the assertion that a careful monitoring and control of potential outgoing risks arising from different activities contributes to stronger business connections between the involved stakeholders (Aktas *et al.*, 2011; Weber *et al.*, 2008) and is returning economic benefits for the firms (Dobler *et al.*, 2014), on the longer term.

Another strand of studies are examining the degree in which environmental and economic performance intertwine, providing evidence to support correlations originated in firm size, pollution propensity, industry sector or affiliation (Bowen, 2000; Walls *et al.*, 2012; Dobler *et al.*, 2014; Clarkson *et al.*, 2008) and in ownership types and stakeholder pressure response (Berrone *et al.*, 2010).

## **2.2. Competitiveness and the issue of fully addressing the driving factors: a focus on environment**

While focusing on the regional characteristics, a particular pluri-perspectivism is encountered throughout the literature, especially in issues concerning competitiveness and the overall performance measurements. Initially a measure of performance in national economies and an expression of complex aggregation methods, competitiveness is becoming an increasingly fuzzy concept, not only because of the multiple definitions and understandings it gained over the years but also because of the implications it tends to have onto the policy planning process; in some cases, turning into a leitmotif guiding operational perspectives and priorities.

Competitiveness can be defined in relation to the sense of territorial functionality and administrative boundaries, and it is significant both at a national and sub-national level. Main theories in the field support this approach, and for example, Schwab and Sala-I-Martin (2014) define competitiveness as the set of factors comprising the institutional and policy making mechanisms that positively influence the productivity level. This aspect is approached from a nation-wide perspective. Productivity, in turn, indicates the emergence of good prospects for prosperity. Similarly, Meyer-Stamer (2008) points out that the competitiveness of a territory is the ability of an administrative unit to generate high and rising incomes for the local population. Another definition given by Dijkstra and colleagues (2011) asserts that regional competitiveness is a sum of territorial characteristics, on one hand, providing an overall stable business environment for existing and emerging firms and on the other, offering good quality living and work conditions for residents and prospective population. As a territorially-connected concept,

regional competitiveness cannot be assessed by following a contracted version of the principles used to assess the national dimension, as Gardiner (*et al.*, 2004) notes; similarly, an extended microeconomic perspective or condensed macroeconomic point of view is inconsistent.

Consistently, the concept is broadly defined in terms of outcomes (living standards/incomes) rather than the factors that determine competitiveness levels (Cambridge Econometrics [CAEC], 2003), and a number of prominent recent studies adopt quite a limited view on what this concept implies, failing to include social and environmental dimensions solidly.

Rather diffuse determinants of competitiveness, environmental factors are present alongside aspects concerning quality of space, culture, demography and social capital, institutional stability, technology and innovation, business and knowledge infrastructure (CAEC, 2003; Lengyel, 2004). A more recent string of research is shedding light on the global and European dimension of competitiveness, reflecting upon the importance of the environment in assuring the sustainability premises for development. Regionally oriented analyses tend to disregard the potential role of the environment in assessing performance levels between these territories (Annoni and Dijkstra, 2013). In the case of the Europe 2020 competitiveness index (World Economic Forum [WEF], 2012), a more sustainable environment indicates potentially good premises towards durable growth. A pillar in the main conceptual construct, environmental presence is signalled through several indicators, although only remotely and diffusely targeting potential risks for the socio-economic environment: renewable electricity production, terrestrial biome protection, environmental treaty ratification, enforcement of environmental regulations, quality of natural environment, CO<sub>2</sub> emission per energy use percentage and particulate matter concentration over the 2.5 threshold level. Similarly, the Global competitiveness index (Schwab and Sala-I-Martin, 2014) presents the environmental issues as factors of sustainability. They are further included as adjustment coefficients for the initial values recorded nationally in the field of policy, use of renewable resources and degradation of the natural environment.

### **2.3. A delicate relationship: environmental risk and competitiveness drivers**

Clarifying the influence of ER within the regional business environment requires a broader discussion concerning the socio-economic, administrative and policy context. The dimensionality of the environmental risk generally outreaches the implications of regional competitiveness, arguing that, without physical environment no actual human activities can take place. There are two sides of economic performance to be discussed in the following, first being the variability of location factors for new firms, and the dimension through which the existence of certain environmental issues is decreasing the attractiveness of the territory from what it represents business-wise and the second is the productivity and performance levels of existing companies in terms of turnover and yield. This approach narrows down the understanding of regional competitiveness, underlining a set of measurable indicators linked to potential natural environment issues.

As a first element in this category, location factors, as described initially by Jovanović (2009), are the wide array of elements that contribute to an increased desirability towards business development within a designated area. Relative to a territorial position, infrastructure development and logistics influence the costs of production and this generally applies to companies from the extractive industries that are using local resources.

Similarly, depending on industry type and approached strategy, the production cycle is more vulnerable towards local resource variation as a result of occasional, unmanaged and damaging events. Additional actions aiming to mitigate this result in increased production prices over time. From a broader territorial perspective, the issue of environmental risk entails a less localised specificity of potential issues and describes risk patterns, variable according to economic specialisation, business tradition, available resources and social and administrative characteristics.

Firms outside the knowledge – intensive domain are also facing more and more uncertainties arising from resource variation and availability. Price volatility for metals, food and non-food agricultural production inputs in the first decade of the twenty-first century tends to negatively characterize recent years, adding to a display of sharp and relatively unpredictable variations in resource prices (EMF, 2012).

Connections between corporate environmental performance, risk management, firm productivity and regional competitiveness are still not fully untangled within the present literature. The article elaborates on the topic of specific environmental risk types influencing productivity levels. Extending this understanding to a regional level, regional business specialisation is sensible to a string of risk factors arising from territorial characteristics, proposing an alternative perspective on risk structure.

### **3. Conceptual and practical considerations for a conceptual framework**

Siding with Dobler and colleagues (2014) in distinguishing between risk origins for the business environment, it is possible to diversify the understanding of threats coming from operations, regulations and in nature. Economic activity is affected by certain conditions within the natural environment from the perspectives entailed by corporate strategy formulation and productive dependency levels.

In terms of corporate strategy measures, firms may choose to accept certain types or risks, deploying mitigation and prevention measures like avoiding, reducing or transferring (Anghelache, 2011). Industries (and for that matter, the place-dependent businesses) are most of the time not environmentally benign, imprints entailing waste, air or water pollution and soil degradation. Attempting to minimise these outcomes of economic activities, firms emphasize more on the effects of corporate environmental strategies in their quest for an increased market visibility (Sinclair-Desgagné, 2004). Other times, their actions are more subtle from the public's perspective, yet focusing on active valuations of the state-driven regulatory process, by including it in the early stages of production. Subsequently, as Kleiner (1991) notes, a solid corporate environmental strategy would eventually display diligent and continuous improvements on product life cycle.

On this background, the idea of 'sustainable production' is gaining momentum. This entails that a distinct type of firms are using local products, attempting to add value to the territories in which they are situated. Consequently, this orientation has become a rather innovative, tasteful trend in the business environment and a good part of this idea is embraced by the society; customers tend to value a product more when it comes from a process that is more sustainable on the long run. Apparel company H&M advertises for conscious practices in clothing sector, introducing the challenge of 'making fashion sustainable and sustainability fashionable' while more local enterprises emphasize on the benefits of ecological products in their quest for competitive advantage.

It is safe to ask whether there is a downside to this approach, and if some secondary risks can arise from how corporate strategies are formulated.

Following these recent trends in development, firms are more vulnerable to changes in the natural environment, especially when they rely intensively on the local resources for production supply. A more dramatic effect is likely to be spiked in the absence of solid corporate strategies to address sequential operational risks. Some scholars argue that the peak of this situation is identified as a symbiotic productive dependency relationship. Guzman Cuevas and Caceres Carrasco (2008) note that the degree of territorial productive dependence [PD] entails either a concentration of suppliers within a territory or an increased number of supplied companies within an industry by only a few providers. Such patterns are seen as vulnerabilities for the local business environment, since, in a case of resource collapse or industry relocation, an incremental implosion or at best, a decrease in productivity levels is likely to be recorded.

When approaching the environmental risk from the perspective of economic activity with a focus on productivity levels and supply chain organisation, a first aspect to take into consideration is the extreme event occurrence rate, (e.g. floods, landslides and other prolonged natural disasters). Frequent and highly damaging phenomena are likely to destabilise local industry productivity initially by hindering the local supply inputs and then later by affecting the efficiency patterns in production (Schmitz, 2005). Naturally, any dramatic changes in production inputs ripple, eventually, into a yield decrease. Another element of importance in this context is environmental change and its long term effects, on economic specialisation patterns.

The 'first nature' dimensionality (Cronon, 1991) referring to geographical specificities, climate and resources is rather impossible to disregard when attempting to assess competitiveness levels. Former literature rightfully excludes this aspect as it is a widely variable factor.

Within this article we approach the regions from a functional perspective, noting that there are quite a few different theories on how to accurately characterise this level. A first idea is that competitiveness should be calculated for functional economic regions while a second states that the region should have an important political and administrative role. In practice these aspects rarely meet, as in most countries regional functionality does not overlap an administrative level. In order to address this issue, a few of the capital city regions throughout the EU are merged to portray contiguous functional urban areas, in respect to actual commuting patterns. The regional level also represents a good starting point for evaluating economic specialisation patterns in relation to the main available resources, traditional occupational practices and even landscape types.

As it would be 'unfair' to characterise the regions in relation to how rich and diverse a natural environment is, the idea of risk incidence and risk management mechanisms in action is developed, upon considering a measurable influence on local conditions. Within this broader context, environmental risk effects on a regional level are cumulative, being a function of percentage of impact on territorially-dependent industries, exposure conditions and vulnerability management operations at firm level.

The proposed mechanics of the envisaged framework are focusing on the delimitation of different territorial levels with respect to the multilevel governance patterns, encompassing risk analysis methods that partly follow the DPSIR framework (Tomás *et al.*, 2004) and Crichton's (1999) 'risk triangle', using hazard, exposure and vulnerability as structural components for the analysis.



Figure 1. The risk triangle. Adaptation after Crichton (1999).

Previously we introduced the idea of sustainability in economic development where firms tend to interact more with the environment in which they conduct their activities, thus valuing more the local resources. For this consideration we introduce the idea of place-dependent firms, aiming to differentiate between the businesses that encouraging and valuing local suppliers and those that are just localised within an area according to strategic location preferences.

For each of these types of vulnerability receptors a set of sources and exposure pathways are identified. A final list of chosen environmental issues that influence the business dimension is presented in Table 1, in relation to a number of environmental problems underlined initially by Norberg-Bohm and colleagues (2000).

**Table 1.** Source and exposure pathway for place-dependent firms (receptors)

Environmental risk (source of risk)	Exposure pathway		
	Quality of production and productivity	Work environment	Specific location factors
Biological contamination of fresh water	•	•	
Toxic contamination of fresh water	•	•	
Chemical releases	•	•	
Salinization, alkalinisation or waterlogging of agricultural land	•		
Pest epidemics	•		
Extreme precipitation variation (increase or decrease)	•		•
Extreme temperature variation (increase or decrease)	•		•
Yearly droughts	•		
Ecosystem modification	•		•

**Table 2.** Source and exposure pathway for other firms and enterprises (receptors)

Environmental risk (source of risk)	Exposure pathway		
	Quality of production	Work environment	Location factors
Ground level ozone formation	•	•	
Toxic air pollution	•	•	
Indoor pollution		•	
Radiation		•	
Soil erosion	•		•
Floods	•		•
Extreme weather events (heat, hail storm, cyclone-level events)	•	•	
Earthquakes	•	•	•

Each row in the two tables presents a subcategory of risks for the business environment. With their impacted elements (i.e. these are identified as adjacent exposure pathways). Finally, the framework is designed with operationalisation perspectives in mind encompassing a set of actions adapted to uncertain and unpredictable contexts; an umbrella strategy (Mintzberg, 1977; 2007). In short, we are proposing a type of framework for frameworks that aims to bring forward a set of conceptual clarifications taking into consideration the operational future perspectives and implementation prerequisites.

#### **4. Discussion**

Following the underlining of a conceptual framework to inspect the type of natural risks that influence the business environment, we are presented with a couple of loose ends, that will be discussed in the following encompassing: interwoven connections between the business and societal dimension, trends alongside the idea of sustainability in production and an extended overview on regional characteristics and properties.

A big part of environmental risk is due to changes in natural systems, changes that are not necessarily a direct consequence of human activities, but that must be acknowledged and mitigated accordingly (Kasperson *et al.*, 2000). Environmental change, a term highly variable according to the territorial scale and impact, presents an array of challenges and potential new threats for the socio-economic and natural dimension (Kasperson *et al.*, 2000; Turner *et al.*, 1990). The ‘global sustainability’ idea provides alternatives to the existing production challenges and unfolding threats with the outcome of proposing paradigm shifts and new development strategies (Raskin *et al.*, 1996; Coenen *et al.*, 2012). As an example, one ‘hot’ topic in the last few years is the circular economy model; this construct emphasises on clear changes within existing production and consumption patterns in an attempt to minimise the impact of human activities on the physical environment (Andersen, 2007; Ellen MacArthur Foundation [EMF], 2012, 2015; European Commission [EC], 2012).

However contextualised, a global sustainability goal is not likely to be achieved without a proper understanding of the small processes and mechanisms governing the sub-national level. A multi-scalar approach is advocated prominently by Szyngedouw (2010), who is finding a basis for political and economic reordering within the perspective provided by the social system’s geometry of power. Specifically, carefully crafted strategies targeting empowerment and development are to value the spatial dimension of the territories. Moreover, the discourse is close to the bivalent issue uncovered by the current place-to-place rationales opposing the more functional ‘place beyond place’ construct (Massey, 2009). From this point of view, a relational appropriation of the sub-national dimension not only presents benefits for the local community, but it also shapes the development of networked regional systems (Celata and Coletti, 2014).

When discussing the importance of regions from a conceptual perspective we draw upon their usefulness in defining (in an integrated way) intermediate processes that cannot be defined at a national or local level. It is the case of commuting patterns and different traditional (economic and cultural) practices that transcend administrative boundaries, and most often, overlap a NUTS 2 region. The case of Center Region in Romania, for example, that includes six counties overlapping most of the Carpathian arch and Transylvania historical area, describes a traditional concentration of activities related to livestock and dairy goods production. Favourable natural and territorial conditions are enabling the growth of food industry. Although, big producers have buffer mechanisms enabling them to sustain continuous production cycles, small producers frequently record fluctuations in supply, a fact mostly in connection with unmanaged



damaging effects (severe draught and flooding events) originating in the natural environment (MARRD, 2014). It is clear that productivity levels within specific industries can be influenced by extreme natural events, especially when quality standards of the outputs are to be assured on a constant base.

Acknowledging the implications of the topic and after a critical review on the existing literature it is clear that there is simply not enough information to provide a complex and integrated perspective on how risks arising from the natural environment are influencing the local firms and enterprises. It is even clearer that much more needs to be done in order to fill these gaps. The framework proposed in this work is intended as one modest contribution to the required effort. We are attempting to design a framework that can help define a conceptual base relevant for priority sets and policy starting points regarding the optimisation of business environment (i.e. from this perspective, with good premises for increasing the competitiveness levels) to better response and adapt to a strand of challenges arising from the natural dimension and to structure the data in a way that makes them usable to a variety of participants in policy making. A potential limitation of the present study is the issue of accurate regional delimitation and correct functionality measurement, considering that some regions are artificial entities created for strategic purposes and, thus, failing to present labour pool commuting patterns, traditional economic activities, ethnic consistency or even cultural continuity.

## **5. Concluding remarks**

Attempting to find out how ER and competitiveness aspects are connected, which risk types are more prominent at a regional level (and for which economic entities), the paper reflects on the accuracy of the existing perspectives in the field, providing the guidelines for a framework to better address the issue of vague conceptual delimitation.

To do so, an overview on environmental risk particularities and the perspectives on regional competitiveness and its large scale implications is provided. Risk is defined in this context starting from the initial understanding of a probability or threat of negative occurrences caused by external or internal vulnerabilities. Risk is a part of a loop process entwining the natural and societal aspects into representing the impact of probable and possible events on the physical and socio-economic dimensions. ER refers to the cumulated effect of different sectorial conditions involving outdoor pollution, climate change and natural hazard occurrence rate to name a few, that directly influence the productivity levels of territorially-dependent local businesses.

ER is the set of conditions and events affecting specific systems, modelling their behaviour accordingly. Typically, two categories exist and they are linked on one hand to human activities and on the other to the natural environment in terms of risk sources.

And additional step in addressing the conceptual clarification entails an overview on regional competitiveness. Competitiveness can be defined in relation to the sense of territorial functionality and administrative boundaries, and it is significant both at a national and sub-national level. Regionally this structure is a mixture between national and local processes, unfolding within a given space, being quite specific in portraying a set of local phenomena that are not relevant at local or national scale such as commuting patterns, location factors for enterprises and firms, cultural and ethnographical areas .

The dimensionality of the environmental risk generally outreaches the implications of regional competitiveness, arguing that, without physical environment no actual human activities can take place. Following this idea, we discuss the existence of ‘place-dependent firms’ as an

expression for economic entities that conduct their productive activities using local resources and inputs. For these we provide an adaptation of the risk triangle provided by Crichton (1991), including the main exposure pathways (i.e. that are in connection with the drivers of regional competitiveness) In search for a method to reflect upon a set of environmental risks and in an attempt to identify which of those account for the development, stagnation or decline of a region, a conceptual clarification is needed. This action contributes to the emergence of a framework, entailing rigorous differentiations according to the territorial scale, exposure pathways, vulnerable entities and source of risk. Subsequently, this study provides a set of key principles acting as building blocks for assessment purposes and to present a base for further investigation on the topic.

The idea of regional competitiveness is multidimensional, in essence a concept stuck in the middle, borderline controversial, assessed in so many different ways, yet to some extent, it still remains an elusive structure. Closing the conceptual gap is achieved by establishing under which conditions the business environment is more vulnerable to events that are beyond immediate human control. This aspect relates to several identified trends: sustainability principles embedded into the corporate strategy implying the use of local renewable resources while adding value to the local territory. Such approaches increase operational risks from the perspective of a higher productive dependence, and consequently, localised natural hazards are much more prone to destabilise supply chains.

Reflecting on the previous statements, this paper hopes to spark future discussion on how vulnerable and exposed are firms and enterprises in the face of natural disasters and other related risks, and how this exposure may influence their performances and, extensively how this modifies competitiveness drivers on a regional level.

### **Acknowledgement**

*This work was supported by the project “Excellence academic routes in the doctoral and postdoctoral research – READ” co-funded from the European Social Fund through the Development of Human Resources Operational Programme 2007-2013, contract no. POSDRU/159/1.5/S/137926.*

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