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A business continuity assessment method using Earth observation data: Verification in industrial zones, Thailand

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Abstract: Private sectors are facing significant challenges in ensuring business continuity amidst diverse and severe hazards, including natural disasters, pandemics like COVID-19, and human-caused crises. Thailand, functioning as a global supply chain hub, experiences a ripple effect on the entire world due to disruptions in its domestic companies and manufacturing bases. To mitigate socioeconomic damages, it is crucial to gain a comprehensive understanding of how crises impact business operations and utilize this knowledge to develop effective business continuity strategies. However, limitations exist in comprehending the impact of hazards on individual companies' business continuity and integrating this information at the municipal or regional level, primarily due to data accessibility and analytical burdens. Therefore, a new analysis method utilizing alternative data is necessary, enabling an indirect assessment of business continuity by observing related events or phenomena caused by business activities, rather than relying solely on direct company data.

This study applies the concept of system dynamics and utilizes changes in airborne concentrations of air composition substances as indicators to assess the status of business continuity. This approach allows for the evaluation of multiple industrial sectors using consistent data sets and provides insights into the impact of industry type, business operation structure, and geographical location on business continuity in the face of hazards. As a case study, this research examines the impact of COVID-19 on business continuity in industrial zones in Thailand, where companies with shared infrastructure and lifelines, such as production bases, electricity, and industrial water, are concentrated. The analysis of air composition substances utilizes the Google Earth Engine, a platform for scientific analysis and visualization of geospatial datasets (Gorelick et al., 2017). The results are further analysed through principal component analysis to determine temporal changes in concentrations. The findings reveal a clear causal relationship between the impact of COVID-19 and the activities in the industrial zones. This insight allows for a comparative analysis of similarities and differences among the industrial zones, providing additional interpretation of the pandemic's impact on business continuity. Through this research, the authors aim to contribute to the academic discussion on the nature of a framework for Area Business Continuity Management (Area-BCM).

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