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## **A FRAMEWORK FOR CATEGORIZING ECONOMIC RESILIENCE IN NATIONAL SPACE INDUSTRIES**

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The space industry is expected to reach a value of 642 billion USD in 2030, roughly double its current value. For spacefaring nations to maintain their growth and thrive in an era of changing geopolitical climate, national and international space law regimes, technological advancement, and public/private investment and consumer demands, they must have a clear quantitative and qualitative understanding of their space industry's economic resilience.

During the COVID-19 pandemic, businesses were dealt with two outcomes; shut down or persevere throughout various lockdown measures. The latter, a result of their economic resilience, is critical for long-term success in dynamic industries. Economic resilience refers to an organization's ability to maintain its current level of economic standing by employing tactics that allow for adaptation to sector-wide changes and small personal losses. At present, the economic standing of national space sectors is measured through national space industry surveys that are composed of economic indicators ranging from employment to innovation. In the United States, the US Bureau of Economic Analysis constructed the US Space Economy Satellite Account (SESA), which contains economic indicators that measure the impact of both private and government space ventures. Countries such as Canada, South Korea, the United Kingdom, and Germany have followed suit and are continuously developing their space economic indicators

for data collection and measurement processes. There is little work attempting to categorize national space industries by the rank of their economic resiliency while also providing next steps revolving around economic maintenance or growth and international collaboration efforts between nations of different levels of economic resiliency.

This proposal offers a framework for a nation's economic resilience in the context of the space industry, which employs the use of six metrics: government civil space expenditures, commercial space sector development, national competitive power, the interaction between public and private actors, and the inclination of the population towards the space industry in terms of value created on Earth. Analytical tools seeded into these metrics provide an objective method of analysis, for instance, each nation's government expenditure towards its domestic space sector is analyzed through benchmarking. Additionally, various sources of funding and local policies are examined. The local population's attitude towards the space industry is also explored and measured through sentiment analysis on domestic media, serving as a proxy indicator of how receptive the nation is towards space entrepreneurship. A Key Success Factor (KSF) analysis is used to determine which corporate strategies, products, services, resources, and capabilities contribute to successes in a commercial space sector's level of development. The VRIN (Valuable, Rare, Inimitable, Non-substitutable) model is used to identify key company resources and capabilities, thus enabling an accurate determination of a corporation's competitive power. Results aid in compartmentalizing nations into categories that offer insight into the maturation of their space industries and provide a set of context-specific next steps to consider.

This framework provides a blueprint that ensures nations are not highly susceptible to growth deterrents. It categorizes a nation's level of resilience (validated by quantitative and qualitative measurement efforts) while encouraging international collaboration so that the emerging national space industries can receive the support needed, from more economically resilient nations, to cultivate a more prosperous and fair access national space industry.