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SUSTAINABILITY OF SMALL SATELLITE PROGRAMS WITHIN EMERGING SPACE NATIONS

**Abstract**

Developing nations around the world are entering a sustainment phase in which the challenges of starting a national satellite program are being replaced with the challenges of sustaining the program. This paper analyzes the factors that impact the sustainability of a small satellite program within an emerging space nation. The analysis proposes methods to evaluate and promote sustainability within programs that are transitioning through phases of maturity - from learning-focused to service-focused. Sustainability for a satellite program refers to achieving continued solvency as an endeavor in which stakeholders invest in order to receive value from achieving objectives. In order to evaluate if a satellite program is sustainable, one must identify the stakeholder needs that the program seeks to address. Stakeholder needs are dynamic and highly impacted by the contextual environment in which stakeholders operate. If the objectives of a satellite program – or any technology endeavor – do not update in response to changing stakeholder needs, the sustainability of the program is threatened.

Leaders of small satellite programs need to consider three areas in order to evaluate the sustainability of their activities. The first area – progress in meeting objectives – accounts for the traditional purview of program management under which leaders use standard models of cost, schedule and technical performance to confirm that stated objectives are being met. The second area requires additional effort to monitor the changes in the contextual environment and consider their impact on stakeholder needs. Thirdly, small satellite programs need to steadily invest in the infrastructure that enables the initiative. This infrastructure includes the organization with its procedures and structure; the process of individuals learning new skills and capabilities; the physical facilities; and organizational capabilities to collaborate on achieving new tasks. In practice, it is challenging to address all three aspects of sustainability simultaneously. As in other fields, leaders of satellite programs must learn to combine exploitation of current strengths with exploration of the changing context.

This paper draws on observations from several earth observation satellite programs in Southeast Asian nations that are working to define the means to ensure programmatic sustainability. These nations have spent several decades focused on training new satellite engineers to have literacy in satellite design and operations. Now they face increasing pressure to justify the continued existence of their programs by meeting evolving stakeholder needs for environmental data, international relations, national security and industrial growth.