

IAF BUSINESSES AND INNOVATION SYMPOSIUM (E6)
Innovation: The Academics' Perspectives (3)Author: Dr. Robert Edgell
State University of New York, United StatesTHE GRAND CREATIVE CHALLENGE OF COMMERCIALIZING INTERPLANETARY SPACE: AN
EMPIRICAL COMPARATIVE TAXONOMY OF ORGANIZING MODELS**Abstract**

Governments are striving to understand the optimal orchestration of public resources, private industry, and the third sector as the means for economically developing interplanetary space. This exploratory research seeks to gain theoretical insights about this grand challenge by comparing four dominant organizing models: public-private partnerships (PPPs), public-private coordinations (PPCs), public-private harmonizations (PPHs), and commercial purchasing practices (CPPs). These praxis models are distinguished by their theoretical origins in either pragmatism, for PPPs and PPCs, or rationalism, for PPHs and CPPs.

Pragmatism theorizes that positive socioeconomic consequences are best achieved through unified cooperation in networks of heterogeneous stakeholders with shared values, governance, and interdependent decision-making that enables collaborative sensemaking. Pragmatism's bespoke abductive experimentation and in situ adaptability make it ideal for "taming uncertainty" over long horizons. In contrast, rationalism anticipates that goals are realized through dualistic transactions across multiple distinct organizations related through formal efficient market schemes and roles. This encourages independent decision-making as constrained by agreements and regulations. Rationalism's standardization, scale, and transactional-basis leads to greater and more immediate efficiencies.

The paper uses a qualitative comparative method to recognize, examine, and explicate commonalities and distinctions across four representative cases. The Comsat-Intelsat case is an exemplar PPP since it was the earliest endeavor to exploit the commercial value of Earth-facing space. NASA's Apollo Moon program is an excellent "old space" PPC illustration since it relied heavily on cost plus pricing arrangements with suppliers. In contrast, NASA's Commercial Crew Program is a "new space" PPH based on fixed pricing with risk assumed by suppliers such as SpaceX. The fictional "dream space" case with scaled-up suppliers readily offering standardized and mature deep space technologies envisions an CPP model.

The results reveal that the models are differentiated by five theoretical dimensions: interdependence and decision-making, constituency risk assignment, bespoke-ness, temporal effectiveness, and impacts on superstructure and infrastructure. Moreover, situational characteristics of phenomenal knowledge and operational certainty are important predictors for model outcomes. Conditions such as those of LEO's current activity state with relatively high phenomenal knowledge and operational certainty indicate that PPHs and ultimately perhaps CPPs are likely to be effective at furthering economic development goals. However, for the challenge of commercializing interplanetary space, the lack of phenomenal knowledge paired with low operational certainty suggest that the PPP and PPC models would more predictably achieve goals associated with the early developmental stages for scalable systems. The paper concludes by discussing inferences for research, policy, and practice.