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FIRST-MOVER ADVANTAGES RELATED TO LUNAR POLAR RESOURCE OPERATIONS AND THE IMPLICATIONS REGARDING HUMAN / ROBOT GROUND CREW MAKEUP

Abstract

Research concerning the advantages and disadvantages accruing to first-movers in multiple industries and endeavors indicates that first movers face multiple challenges in their quest to be "first to market". However, a general conclusion regarding the net sum of advantages and disadvantages cannot be made as the specific circumstances surrounding each case study are generally unique to an industry, a market, or a time period. The nascent lunar commercial resource industry is one such unique case. But for even traditional terrestrial industries, the market entry decision making process gives great weight to two factors which take on even more importance within the context of lunar resource site selection and its impact on the firm's potential competitive advantage: 1) access to scarce resources and/or real estate and 2) the ability of "early followers" to imitate, or reproduce, the same results as the first-mover. Thus, considering that the most optimal lunar resource collection site will need to possess a unique combination of several rare features (nearly constant sunlight in close proximity to permanently shadowed areas near viable concentrations of ore with a short and obstacle free route of travel to the ore bed), early occupation of the most optimal site may provide a critical and non-imitable long term competitive advantage to the firm able to move first. Presently, many firms, when discussing potential space resource operations, talk generically about using an "all robot" workforce to accomplish the innumerable tasks involved in the prospecting, mining, production, and transport of finished resources to customer distribution nodes. While this approach reduces the costs and risks associated with the early involvement of human ground crew, given the differing states of our demonstrated ability to land and utilize humans and basic robots on the lunar surface vs the current inability of an all-robot workforce to set-up a highly complex resource collection operation, the potentially slower all-robot methodology may ultimately cost the firm far more in lost future revenue if forced, as a second-mover, to operate from a competitively disadvantaged location. Thus, to characterize an exploration and deployment methodology that best supports a successful "first-mover" timeline, this paper will examine potential deployment speeds as a function of two types of methodologies: a hybrid human/mechanical approach vs an approach using solely robotic operations. The paper will also examine the time "delta" between these two approaches and what it might mean to a firm considering a "first-mover" strategy.