

BUSINESS INNOVATION SYMPOSIUM (E6)  
Public/Private Human Access to Space - Supporting Studies (2)

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UNDERSTANDING THE DYNAMICS OF INNOVATION IN THE ORBITAL LAUNCH VEHICLE  
INDUSTRY USING THE ABERNATHY-UTTERBACK INNOVATION MODEL.

**Abstract**

Right from the 1950s to the present day, the Orbital Launch Vehicle (LV) industry has seen different stages of evolution. These stages characterized not only technological innovation leading to better product designs like the Space Shuttle in the 1980s but also process innovations leading to more reliable and lower cost vehicles like Falcon 9 in recent times. However, several factors have played a role in bringing about a transition in the Orbital LV industry and thus it is interesting to understand as to what governs the dynamics of innovation in an industry. In 1978, Abernathy and Utterback came up with their model (known as the A-U model) to study the dynamics in an industry over time due to innovative changes. According to the model, any industry goes through three different phases characterized by either product innovation, process innovation or performance innovation. This paper tries to apply the framework provided by the A-U model to understand the dynamics behind the innovations in the Orbital LV industry. The paper primarily focusses on the timeline involving the development of the Evolved Expendable Launch Vehicles (EELV) program by the USAF as well as the emergence and development of the Falcon Program by SpaceX. This timeline is chosen to highlight the effects of innovation on the organizational and commercial structure of an industry. The paper then assembles the innovation trends from the two timelines to put together the broader timeline of how the Orbital LV industry, as a whole, has evolved over time. The framework that is applied to each of these timelines will be analyzing the changes occurring in the industry in terms of i) product innovations ii) production processes iii) number of competitors and iv) the basis of competition. The paper is an industry analysis which is meant to be a starting point of discussions in the Orbital Launch Vehicle industry leading to improvements and advancements in the industry.

Keywords : EELV program, dynamics of innovation, Abernathy-Utterback model, Falcon Program