Paper ID: 66165
student

IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Small Launchers: Concepts and Operations (7)

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PROSPECTIVE ANALYSIS OF THE ECONOMIC VIABILITY OF A SMALL LAUNCHER

Abstract

During the last ten years, the established international space order has been compromised by private players using breakthrough innovations (e.g. 3D printing or vertical landing). The space launcher sector experienced a low-end disruption by SpaceX in 2010 and then, since 2018, a new market has emerged: small launchers (< 1 ton), targeting the small satellites market (< 500 kilograms).

This paper aims to present the economic equation of a small launcher company. Can it be profitable? Starting with conclusions from interviews of 200 renowned experts in the space industry, including Johann-Dietrich Wörner (ESA Director General) and Jim Cantrell (Co-founder of SpaceX), this paper proposes a modelization of launcher market evolution through the Clayton Christensen disruption theory. A satellite database was built to analyze this market trend without the Starlink constellation. Then, it proposes some prospective models displaying the number and mass of satellites to be launched over the next decade. Combined with the development and operations costs model of a small launcher, these models frame the economic equation of a small launcher company.

The graphs revealed that the number of small satellites launched has increased by 160% (50% without Starlink). But this represents only 16% (4% without Starlink) of the whole mass sent over 5 years. Furthermore, the mass growth rate of 8% per year is deeply related to the Starlink constellation, as it falls to 0.68% without it. This paper highlights three profiles of launchers customers' needs: traditional big satellites looking for reliability in a launcher whereas CubeSats companies are seeking a low price and NewSpace companies are striving for personalized and quick launch services.

From the prospective market models, the results are showing that the slow decline in the heavy satellite market will probably continue at the same speed, while the light satellite market will grow at a rate of around 5% per year excluding mega-constellations. The economic equation shows that a small launcher can be profitable within ten years, if the small satellites market grows about 5% per year and if the small launcher captures at least 9% of this market. The final equation allows six small profitable launchers worldwide: three in the USA, one in Europe, and two in Asia. Finally, this paper observes that the small launcher investments may look like a financial bubble. The real reason behind small launcher projects is geostrategic: it gives autonomous access to space for a nation, profitable or not.