Cargo Bay: Market Analysis

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Introduction

Cargo Bay is preparing an online brokerage site site which will allow governments, communications firms, and similar entities to sell the unused space inside of launch vehicles which are used to put payloads into space. The target buyers of this cargo space would be researchers and academic groups who can benefit greatly from putting small payloads into space but cannot afford the steep costs associated with launching a payload into Earth orbit.

The viability of online auction sites has been well demonstrated with the success of services such as EBay and Offer Up but this specific service offering has been left untouched. The closest comparable market provider is SpaceX's "ride sharing" program which allows organizations to purchase as little as 440lb of payload space for $1 million [1]. This price point of roughly $2200/pound is very impressive when compared to the historical figures of space flight but it's meaningless for groups that can't afford or don't need the full 440lb. There is a demand for reliable launch services in the 1 to 100 lb range and that demand is unmet by current markets.

Cargo Bay's proposed model means that our customers will be both large groups seeking to amortize the high costs of satellite launches by selling unused cargo capacity and the small groups looking for access to space based research projects. A small percentage of each sale would be collected by Cargo Bay to sustain the business without dampening the trade potential of the site. A target percentage of 2% has been chosen to meet the market standard set by EBay.

Potential Customers

According to a recent MarketLine report [2] NASA has paid out $14 billion dollars in resupply contracts to the private space industry up to the time of the report (July 2019). This report also notes that, "The primary reason for [companies being hesitant to commit to developing space industries] is that beyond tourism, there are very few economic reasons that would draw companies into space." Giving researchers access orbital launch capacity could address this disconnect between the potential and the activity we've seen in space-based industries.

But any analysis of Cargo Bay's potential customer base really requires an analysis of two different groups: one (governments and telecommunication companies) are the ones already putting rockets into space, and the other (hobbyists and research groups) are the ones who need access to that capacity. Let's start by looking at the first group to estimate potential offerings on Cargo Bay.

SpaceX's Falcon 9 rocket can put a maximum of about 22,000 lbs into low earth orbit when the launch stage is being recovered according to the company literature. This particular vehicle is

exemplary of low-cost and highly re-usable space flight vehicles and provides a good example to use for analysis. The heaviest single satellite ever launched on a Falcon 9 has been the Intelesat 35e which ways roughly 15,000 lbs. This means that there would be a discrepancy of 7,000lb of unused cargo space on this flight and at least as much on any other. There were 88 satellite launches in 2018 meaning that at least 616,000 pounds of launch capacity went unused in 2018.

% of market vs. price/lb	1%	2%	5%	10%	15%
$1000	$6.2m	$12.4m	$31.0m	$61.6m	$92.4m
$2200	$13.5m	$27.0m	$67.5m	$135.5m	$202.5m
$5000	$30.8m	$61.6m	$154.0m	$308.0m	$462.0m
$7000	$43.1m	$86.1m	$215.5m	$431.2m	$646.5m
$10,000	$61.6m	$123.2m	$308.0m	$616.0m	$924m

Table 1: the total valuation of 616,000 lbs of unused launch capacity from 2018 at various market penetrations and price/pound. $1000/lb is SpaceX's stated target, $2200/lb is the current cost to launch on SpaceX's rideshare program, and $10,000 is a rough estimation of the cost paid by NASA for payloads carried on the space shuttle.

So we can see that there is potentially a great supply of unused launch capacity that could be listed for buyers to bid on through Cargo Bay. But without buyers this venture would still be unsuccessful. Another MarketLine analysis[3] notes that university spending on academic departments increased 85% between 2000 and 2009. Another study[4] shows that federal contributions to university research is $34 billion annually. This works out to roughly $212,000/PhD student. Although this is a great amount of money it indicates that it would be very rare for a research team to be able to afford a $1m satellite launch, much less the cost of the satellite itself. With increasing competition to maintain relevance in an environment of open information universities are engaging in more aggressive brand management. The ability to put small satellites into orbit would contribute to the high visibility, wide interest publications that drive the university brand.

% of research grants vs. price/lb	0.1%	0.5%	1%	3%	5%

$1000	34,000lbs	170,000lbs	340,000lbs	1,020,000lbs	1,700,000lbs
$2200	15,454lbs	77,272lbs	154,545lbs	463,636lbs	772,727lbs
$5000	8,500lbs	42,500lbs	85,000lbs	255,000lbs	425,000lbs
$7000	4,857lbs	24,285lbs	48,571lbs	145,713lbs	242,857lbs
$10,000	3,400lbs	17,000lbs	34,000lbs	102,000lbs	170,000lbs

Figure 2: the total demand for launch capacity based on percentage of $34b research budget at several price/lb points. The price/lb predictions are based on the same spread as Figure 1.

Routes to Market

Cargo Bay would function as a purely internet based auction house. This gives Cargo Bay the flexibility of never depending on a single customer or base of customers. Rather Cargo Bay would act as a service provider who is engaged in providing a forum for buyers and sellers to meet. This business model provides low overhead, easy scalability, and low personal risk for Cargo Bay.

If we think of Cargo Bay as a service provider then we can see that the forum amounts to online retailer. There won't be any middleman between Cargo Bay and it's customers, who will be both the buyers and the sellers. This presents some risks and some opportunities to Cargo Bay. The risks are that our effective customer base will only ever be as strong as the weakest of the two, since Cargo Bay does not get paid until a transaction takes place. That means that a shortage of either buyers or sellers will harm the sales flow of cargo bay while an excess of either won't help at all. But the tradeoff is that there is no manufacturer to control or restrict the pace of business. As a service provider Cargo Bay will have direct access to its customers with any other controlling influence.

Competition

There are no direct competitors for Cargo Bay who are currently servicing the markets we would be targeting. But there are some players who could make easy transitions into our market if the Cargo Bay model proves to be viable. The first potential competitors are other online auction sites who could shift their listing to include unused orbital launch capacity. EBay has been steadily expanding the variety of listed items on their site since they started and it is reasonable to think that they would want to expand into this market if they saw a profit. A second potential competitor would be the launch providers themselves (e.g. SpaceX, Blue Origin, Northrop Grauman, etc.) could start to offer smaller parcels within their launch vehicles. As we mentioned earlier, SpaceX is already offering a "ride share" program that allows several users to purchase a portion of a Falcon 9 rocket separately. Their current smallest offering is 440lbs but they could begin to offer smaller packages if Cargo Bay is able to demonstrate that there is a demand for launch packages in the 1 to 100 lb range.

Cargo Bay's best response to these potential competitors is to establish ourselves as an industry standard early on. Sellers listing high value goods and buyers whose careers may depend on a reliable launch will be slow to adopt new practices when another broker moves into this market. While this force might harm Cargo Bay early on, when our low overhead makes us most resilient against slow markets, it will later be a protective force that will keep other groups from encroaching on our market share.

Hurdles

The difficulties that Cargo Bay will face before we can make a beachhead as an online auction house for space launches but each of them is addressable. The difficulties we will consider are: insurance, legislation, and slow demand.

Currently only 5% of satellites are insured[2]. Several factors contribute to this fact. First is that insurers have a difficult time estimating the risks to a piece of hardware in orbit. Second, it's very difficult and expensive to service a satellite so insurance could never really pay out for partial damages. This might make potential sellers concerned about sharing a rocket with other satellites which could potentially damage their own. This is a very real concern and Cargo Bay will have to demonstrate that ability to recoup the high cost of purchasing a rocket will offset the risk of damage to the payload.

The regulation of the space industry is still a grey area. The FAA exercise control of launches which take place in the United States but the concept or "air space" is impossible to enforce in orbit. Instead there is only a loose system of cooperation between NASA, the European Space Agency, the Russian and Chinese governments, telecom companies, and the many other stakeholders in near space. As a broker Cargo Bay has no need to worry about the actual operation of any of the spacecraft but any regulation that control space launches will still affect our ability to do business. Cargo Bay will avoid the most stringent regulations by not carrying space for manned flight. Cargo is regulated much less strictly than human travel and so by not offering space for human flight, Cargo Bay can establish ourselves as a business without having to demonstrate the safety of the sold products to the FAA.

Finally, Cargo Bay expects a substantial delay in the demand for the launch space being sold at auction. Research groups who are interested in purchasing launch capacity will have to first find funding and then build the hardware to launch. This will contribute to a delay in their purchasing of launch space of a year or more. Cargo Bay will address this issue by maintaining a fixed-cost, low overhead model until the market begins to expand.

[1] https://www.spacex.com/smallsat
[2] The Business of Space: Newly emerging private space industry has significant opportunities & risks, MarketLine Theme Report, July 2019
[3] Universities: Higher education has become driven by capital, making universities education businesses, MarketLine Case Study, December 2015
[4] Modeling research universities: Predicting probable futures of public vs. private and large vs. small research universities; William B. Rouse a, John V. Lombardi , and Diane D. Craig; Proceedings of the National Academy of Sciences; 2018