The Obstacles to Financing New Space Industries

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Abstract

The potential for commerce in outer space is enormous. Although space commerce thus far has been limited to the satellite and launch industries, other New Space Industries (NSIs) are in the offing. Space tourism and entertainment, manufacturing, business parks, R&D, satellite repair and transfer services, space debris removal—these are just a few of the industries with long-range commercial outer-space potential. Crucial to the success of these NSIs is identifying the likely sources of their investment capital and overcoming the obstacles to their financing.

Introduction

Securing the initial financing for NSIs will not be easy. The traditional sources of funding—bank loans, venture capital, debt and equity markets, and government subsidies—will be accessible only to the most competitive businesses. Even then, when bankers, insurance companies, and private investors calculate the expected risk and return of outer-space business endeavors, including Moon and Mars exploration projects and proposed settlements, they will probably be less than sanguine about the early prospects. The exorbitant cost of launches—currently costing as much as $10,000 for each *pound* placed in orbit—and the need for a basic infrastructure to support life and industrialization in outer space are just two of the more salient near-term deterrents to outer-space commerce .

Nonetheless, new markets encourage creative financing. Space development banks, commercial spaceports, favorable legislation and policies, and even lotteries have been proposed for bridging the early development stages of the various NSIs. The pace at which we move toward this new industrialization is not just dependent on technical know-how and advancements. How these new ventures are financed in the early stages of development will greatly influence not just the pace of commercialization, but the character of this industry's development as well.

Financiers will evaluate commercial space projects just as they do terrestrial ones—using traditional financial measures of estimated risk and return. The traditional tools of the trade used in commercial space financial analysis include the return on investment (ROI), the internal rate of return (IRR) and net present value (NPV) calculations, a payback period determination, an evaluation of the market size and its potential, debt financing, equity financing, and other traditional sources of funding. The newer the industry and the venture, the more uncertainty and risk will be factored into the decision -making

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process. Furthermore, the financial industry will demonstrate a higher degree of comfort as reflected by their investment policies, with the more established and familiar business ventures.

Commercial Satellite Profitability

Lest anyone doubt the profitability of businesses commercially operating in space today, they need look no further than the commercial satellite industry. This industry has a thirty-four year track record of commercial space operations dating back to April 1965 when the Early Bird satellite was successfully launched. Since then, commercial space ventures have grown and profited to an impressive degree.

To gauge the growth and profitability of the commercial space business, we need reliable data. *The U.S. Industrial Outlook*, published annually by the U.S. Department of Commerce has provided useful information for this industry. Communication satellites were first mentioned in *The U.S. Industrial Outlook* in 1962 under "International Communications." The satellite industry was given its own separate category in *The U.S. Industrial Outlook* in 1978. In 1978 the discussion focused on COMSAT, and for the first time *The Outlook* reported separate satellite industry revenues, which reflected COMSAT's entire 1976 operating revenues of almost $154 million.

Twenty years after this first report of commercial space operating revenue, KPMG Peat Marwick and associates issued the *1997 Outlook: State of the Space Industry*. This report put global operating revenues for the satellite industry at $62.2 billion for 1996 and forecasted global operating revenues for the industry to be $106.6 billion in the year 2000. Using the KPMG analysis, revenues for the satellite industry increased more than 406 times in the twenty years since COMSAT's operating revenues were first reported in *The U.S. Industrial Outlook.*

In addition to the KMPG *Outlook* report, two other industry reports are useful in demonstrating the financial success of this industry, though they don't evaluate and analyze the industry in the exactly the same way. Merrill Lynch, in its most recent annual satellite industry review, *Global Satellite Marketplace 99*, projected the industry to increase from an estimated $36 billion in 1998 to $171 billion by the year 2008. This represents a 17.5 percent annual growth rate.[1]

C.E. Unterberg, Towbin, a noted financial company with offices in New York and San Francisco, produces *The Satellite Book* with quarterly updates. According to the second quarter 1999 issue, the commercial satellite industry is estimated to grow from a $54.8 billion industry in 1998 to an estimated $116.3 billion in the year 2003.[2]

It is also worth noting several examples of the financial success of some of the pioneering space companies—Hughes, Loral, COMSAT, PanAmSat, AsiaSat, Inmarsat, and Intelsat. These companies were selected as examples because of their long operating histories in the business, their financial data was readily available in their 1998 annual reports, and they have profited from their operations along with either mergers, acquisitions, or sales to the government.

Hughes Electronics is one of the surviving Hughes companies and is solely in the tele-communications and space business. According to their 1998 annual report, Hughes Electronics Corporation reported total revenues of $5.96 billion, net income of $2.507 billion, and assets of $13.4 billion.[3] Loral Space

and Communications also has a history which dates back to the beginning of the satellite industry. According to their 1998 annual report, the company reported revenues of $1.301 billion, a net loss of $138.7 million, and assets of $5.23 billion.[4]

COMSAT Corporation, established by Congress in 1962, reported 1998 revenues of $616 million, net income of $26 million, and assets of $1.79 billion.[5] COMSAT has not been blessed with steady growth and profitability, but still the company has managed to demonstrate impressive financial strength in its thirty-seven year history.

PanAmSat was founded in 1984 by Rene Anselmo for the purpose of competing against the government-owned international satellite monopoly. Hughes Electronics and PanAmSat merged their respective fixed satellite services operations in 1996. The new PanAmSat, according to its 1998 annual report, reported total revenues of $767 million, net income of $124.6 million and assets at $5.8 billion.[6]

AsiaSat is Asia's premier provider of high-quality satellite systems and is a major service provider for the Asia Pacific region. According to AsiaSat's 1998 annual report, the company reported total revenues of $116.5 million, net profits of $60 million, and assets of $460.44 million.[7]

Inmarsat reported 1998 revenues of $[8]400 million, net income of $125.5 million, and assets of $850.5 million.[9] According to the company, on a cumulative basis the return on Owners' Equity has been 18.1 percent and since inception, the return on the average capital invested by the Inmarsat signatories has been 22.1 percent.[10]

Intelsat has certainly prospered since its creation. According to their 1998 annual report, Intelsat reported operating revenues of $1.02 billion, net income of $547.2 million, and assets of $3.08 billion.[11]

Following below is a summary of this information in table format.

Company	Revenues	Net Income	Assets
1. Hughes Electronics	5.96 billion	2.507 billion	13.4 billion
2. Loral Space & Comm.	1.301 billion	(138.7 million)	5.23 billion
3. COMSAT	616 million	26 million	1.79 billion
4. PanAmSat	767 million	124.6 million	5.8 billion
5. AsiaSat	116.5 million	60 million	460.4 million
6. INMARSAT	400 million	125.5 million	850.5 million
7. INTELSAT	1.02 billion	547.2 million	3.08 billion

These companies and others have changed over the years and their growth has not always been consistent. Still, it is obvious that commercial space operations have been highly profitable for these

companies. Knowing that this profitability and growth can be earned from space business operations is an incentive for the New Space Industries.

Obstacles to Financing NSIs

Despite this potential, there are obstacles to financing NSIs and the additional commercialization of outer space. Some of these obstacles are already adversely influencing the commercial space industry with the potential to adversely impact NSI financing. In two examples that will be cited, investment dollars are flowing to more competitive and attractive investments in competing industries.

Market conditions can be one of the more critical obstacles. This is best shown by looking the status of the constellation satellite systems such as Iridium, LLC and ICO Telecommunications, both low to medium orbit satellite communication systems. Iridium has suffered a disastrous first year of operations and was involved as the defendant in several class-action lawsuits.[12] The company filed for bankruptcy in mid-August 1999 and is currently operating under the protection of the bankruptcy courts..

Iridium's problems prevented ICO Global Communications of London from obtaining its financing, which was to consist of a minimum of $500 million from its existing shareholders and the financial markets.[13] ICO required an additional $1.7 billion to complete its global satellite communications system network. According to financial analysts, "the failure of ICO's rights' offering is a signal that investors, shaken by the commercial problems of ICO competitor Iridium LLC, are looking more skeptically at mobile satellite services. The basic questions these guys have to answer is: Where is the market? Until they convincingly answer that question, they will have a tough time raising capital."[14] ICO filed for bankruptcy shortly after Iridium's filing.

The problems are not limited to just Iridium and ICO. Teledesic, another of the constellation satellite systems which serve a completely different market segment than either Iridium or ICO has put aspects of their project on hold or delayed them. Furthermore, the investment community is quite reluctant to make additional investments in these companies resulting in significant problems for the industry.

There are other obstacles as well, including those that affect the financing for the design and testing of Reusable Launch Vehicles (RLVs). Peter B. Teets, president and chief operating officer for Lockheed Martin, when referring to their VentureStar reusable launch vehicle, told Congress on May 21, 1999, that its project was unsuccessful in attracting "Wall Street investors and would need some form of added government funding or loan backing. Wall Street has spoken. They have picked the status quo—they will finance systems with existing technology. They will not finance VentureStar."[15]

RLV financing has also been clouded by the fact that RLVs are primarily being designed for launching small payloads to LEO. Though the market may seem large, it is plagued with uncertainty, which makes it difficult for an RLV company to attract investors and capital.[16] The financial problems of ICO, Iridium, and other LEO satellite companies contribute to this uncertainty. With the problems of the constellation satellite systems, the RLV manufacturers have to demonstrate to the financiers that there are markets for their vehicles, markets that will enable the RLVs to have substantial enough earnings to pay back the investors in their expected time frame and with their expected return on investment. The fact is that demonstrating markets other than those associated with telecommunications is a challenge at this stage of development in the commercialization of space.

One such alternative market might consist of resupply missions to the International Space Station but that is questionable given the fact that NASA controls these missions and so far the Shuttle is the only available vehicle, other than traditional launch vehicles and the Russian vehicle used to supply their space station, Mir. The other alternative market, space tourism, certainly has the potential to drive the development of the RLV market but most RLVs were being initially being designed for cargo and satellite transportation, not people. The passenger carrying RLVs were being considered for a later development date, after the RLV technology had been proven through a period of operations.

Statements made by NASA Administrator Daniel Goldin and other prominent space professionals such as Mr. Teets can adversely influence the financial community and create obstacles to financing. For example, on July 12, 1999, *Space News* quoted Goldin as saying that U.S. companies and investors won't finance costly new launch-vehicle programs without further reducing the technical and financial risks.[17] Goldin also was reported to have said that NASA will probably have to "retire the technical risk. There isn't one corporate executive in their right mind that would take on a multibillion dollar investment that won't have a payoff until 10 years from now. In the space community, we have space in our heart. When you're in corporate America, you've got to meet the numbers."[18]

A New Law

Compounding the problems of financing commercial space projects are new laws and regulations involving export restrictions. On October 17, 1998, the 105th Congress passed The Strom Thurmond National Defense Authorization Act of Fiscal Year 1999, which created changes and new policies in matters relating to commercial satellite export controls. In essence, this bill transferred the export control for commercial satellites and all their related activities from the Commerce Department to the State Department, effective March 15, 1999.

This bill has set a threatening tone for U.S. companies involved in the commercial space industry. There is also the risk that this bill may be only the beginning of legislative efforts to restrict U.S. companies from exporting their products, a development which can potentially damage American businesses in the international marketplace. The bill has already had a negative effect on satellite companies seeking insurance, which is essential for obtaining financing. A recent example involves DirectTV, Inc. of El Segundo, California. The company was forced to delay its late-August launch of its direct-broadcast television satellite because insurance was unavailable. As a result of these export controls, the U.S. State Department prevented the company from sharing technical information about the satellite with the non-U.S. insurance underwriters. The underwriters were refusing to insure the satellite without the technical information which they claim they need for underwriting purposes.[19]

Other Obstacles

Additional obstacles to commercial space financing today stem from the amount of money that is being invested in other industries. Internet companies are at the forefront of obtaining sizeable investments from various financial sources. Since the amount of money available for investment is finite, regardless of how much it is, internet investments are absorbing dollars that might have been available for a commercial space project. This is an example of the fact that investments will be made in those businesses and industries with the greatest potential and least amount of risk. For commercial

space projects to be the recipient of investment dollars, they will have to be competitive with terrestrial investments, including present “barn burners” such as the internet.

Providing communications across continents and under the oceans are the enhanced fiber-optic undersea cables which are capable of transmitting high speed internet, voice, and visual data faster and cheaper than satellites. In fact, the advances in the modern undersea fiber cables, along with the way the cables are now managed and financed, contribute to the problems being encountered by the constellation satellite systems as they are as competitive as the fiber cable systems. Also, new advances is fixed wireline/cellular systems give these systems distinct advantages over the satellites as well.

Venture Capital And Other Studies

In examining the potential for financing NSIs, I conducted two studies of the venture capital industry using two similar surveys in 1996 and 1998. The 1996 survey was addressed to eighty-one California venture capital firms and one venture capital company in Georgia, while the 1998 survey was sent to over six hundred national venture capital companies. They each received a response rate of 17 and 10 percent, respectively.

Two additional studies have been cited for this paper. The earliest one is from a 1988 Claremont University doctoral dissertation on commercializing space by Peter Portanova. Dr. Portanova contacted large and small aerospace executives, academia, and government agency and department representatives for their thoughts and opinions on various issues regarding business opportunities and space commercialization. The average response rate for his survey was 51%.

The most recent survey cited is from the U.S. National Chamber of Commerce and NASA at their jointly sponsored "National Forum on the Future Development of Space," held in March 1999. The forum audience included commercial space company executives, commercial space entrepreneurs, space advocates, and representatives from NASA and other space agencies. The audience was electronically surveyed after the presentations and panel discussions.

These four surveys examined important but separate target audiences involved in the space industry and the development of NSIs, including their financing. Common concerns about commercializing outer space were expressed in all four surveys. The responses showed striking similarities despite the different audiences spanning the eleven-year period from the first to the last survey.

One of the questions common to all four surveys sought to identify the barriers to the commercialization of space. The concerns centered around the high cost of getting into space, high insurance expenses, long development times, government policies, high risks of funding with the requirement for equally high returns, unknowns and uncertainties, inexperienced space company management, space policy, and legal issues. Depending on the group surveyed, the priority of these issues were different, but all groups reported the same items of concern, all of which have the potential to severely impact the likelihood of a commercial space venture obtaining favorable financing.

All those surveyed over the eleven-year period recognized that commercial opportunities are possible in outer space. The most likely commercial opportunities cited have remained constant over the years

and include launch services, communications, microgravity projects, infrastructure, remote sensing, space tourism, and extraterrestrial resources. The most frequent follow-up comment was that because of the risk and other factors mentioned earlier, these opportunities may encounter problems in financing and implementation.

The venture capitalists were mostly concerned about the lack of management experience and depth for new space business ventures, as well as the high business risks, political risks, and the high costs of the project. Market size was an important concern, as was the probability of very high investment and capital costs. Internal rates of return higher than 50 percent were cited as mandatory, with payback periods ranging from three to six years. Also mentioned was the degree of management control that would have to be abdicated in return for venture capital investment. Most felt these conditions would be too extreme for most companies to handle, thereby making venture capital somewhat unattractive as a source of financing to the expanded commercial space industry.

A very serious concern expressed by the venture capital respondents was the issue of competition for the investment dollar with terrestrial investments. As pointed out earlier, this is already happening as internet, undersea fiber-optic cables, and fixed cellular/wireless investment opportunities are getting funded while most satellite investments are having trouble. New space business ventures can successfully compete for these funds, providing the investment merit of the space project equals or surpasses the alternatives. This is potentially a significant obstacle in NSI financing, especially in the early phase of this industry's development.

While the venture capitalists have expressed concerns about competing for available investment funds, it is worth examining the size of the venture capital market to determine if the market itself is a limiting factor for NSI investment. According to VentureOne of San Francisco, a primary resource company for the venture capital industry, 1998 produced record venture capital investments at the "all time high of $12.5 billion, a 12.5% increase from the 1997 total of $11.2 billion."[20]

Furthermore, there were 1,824 recorded venture capital transactions for 1998, up from 1,821 recorded transactions for 1997.[21] The venture capital trend is continuing for 1999 as the first quarter represented the highest amount of venture capital raised to date in a single quarter at $3.59 billion, a 31.8% increase over the first quarter of 1998 and a 10.5% increase over the fourth quarter for 1998.[22] With the amount of capital flowing to venture capital markets, the problem facing the developing commercial space industry is not a shortage of funds; rather, it is the nature of the business itself.

Venture capital on its own is not the most important component of financing for commercializing space as we head into the next century. It does, however, represent a key foundation component for the overall industry. Because of this, it can be a valuable and important teaching tool along the way to the eventual creation of a commercial space environment which will be “just another place to do business.”

In addition to venture capital, NSI proponents would benefit from not only enhancing their attractiveness to the financial industry, but working toward constructive government tax and incentive programs as has been the case with the development of other industries. Bridge-financing assistance through the creation of both national and state space development banks and commercial spaceports would also be an important element in paving the way for commercially successful NSIs.

Conclusion

Financiers will be paying attention to the bottom line, the time it takes to return their original investment, the return on their investment, both the political and the financial risks and costs, and the marketability of the NSI product or service. Ventures receiving financing will have to demonstrate their capability for success in these areas. The same is true for private-sector financing for the Moon and Mars exploration ventures and settlements. Without demonstrating the economic viability of such programs, private-sector capital will not readily flow to them. Research and development alone will not attract or justify private-sector funding as these ventures will be steeped in uncertainty in terms of what financiers, lenders, and investors look for when they commit their funds to a project. If private funding is going to be a preferred source of financing for these ventures, then the ventures will need to show how the needs of those making the investment can be met. Aside from the resourceful space lovers who will support space projects regardless of business merit, the great majority of investors will require rational, grounded, and proven financial results. This point should not be forgotten or lost when planning new space development projects, despite the existence of millionaire space enthusiasts who will support a commercial space project because of their commitment to space exploration and development.

There are ways for the government to assist in making sure that commercial space investments and ultimately NSIs can be financed and jump started. Some of these assistance methods include program for tax relief or other incentives such as the zero gravity—zero tax plan, new launch industry legislation, the government support of the commercial space industry as was previously done with other new industries such as the airmail industry, loan guarantees and other measures as well. Space Development Banks, both national and state, can also be helpful as can commercial spaceports and the proposed legislation which will enable them to raise money for commercial space purposes as do airport authorities using municipal bonds.

Expanding into and developing New Space Industries can be as potentially lucrative as what happened with the satellite industry. Key to the success of these new business ventures will be the initial financing. Yet there are still significant obstacles that need to be addressed before NSIs can become reality. To succeed, it will behoove the management of NSIs to understand how they are going to be evaluated. They must present legitimate business plans, projections, and forecasts to demonstrate to financiers that their ventures can not only compete with terrestrial investments, but can ultimately be profitable. When they are able to do this, the commercial space industry will be opening the door to $pace: The Final Financial Frontier!

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[2] J. Armand Mussey, William B. F. Kidd and Patrick Fuhrmann, *The Satellite Book,* vol. 1, no. 2, (New York: C.E. Unterberg, Towbin, 1999), 7.

[3] Hughes Corporation, 1998 Annual Report, 50-52.

[4] Loral Corporation, 1998 Annual Report, 31.

[5] COMSAT Corporation, 1998 Annual Report, 17.

[6] PanAmSat Corporation, 1998 Annual Report, 39-40.

[7] Asia Satellite Telecommunications Holdings Limited, 1998 Annual Report and Accounts, 31-32.

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[9] INMARSAT, 1998 Annual Report and Financial Statements,16-17.

[10] Ibid., 14.

[11] Intelsat, 1998 Annual Report, 25, 35.

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[21] Ibid.

[22] Ibid, http://www.v1.com/research/venturedata/stats/q199/news.htm.

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