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UKRAINE'S NICHE IN THE U.S. SPACE LAUNCH MARKET: WILL KIEV'S HOPES COME TRUE?

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Abstract

Ukrainian government and industry leaders are very sensitive to the political and economic aspects of their National Space Program, and have made it clear that they will not yield to Western pressure to give up their missile industry as they did with nuclear weapons. At the same time, Ukraine's denuclearization has shown how effective not only "sticks" but also "carrots" can be. Cooperation with the United State and other Western nations can give Kiev the sense that Ukraine's advanced missile industry has been recognized and respected, as well as that such cooperation could bring more economic profit than illicit trade with "rogue" nations.

Ukrainian aspirations for collaboration with U.S. space industries are much more substantial than for that with other countries, and a share in the American market is a major goal of the National Space Agency of Ukraine. The U.S.-Ukrainian launch agreement contains similar terms and conditions to pacts with Russia and China, which make Kiev feel satisfied and even flattered. The 1994 "umbrella" agreement between Presidents Clinton and Kuchma provides for joint efforts in space exploration in the future. Today, it seems premature to go beyond a very rough evaluation of the expected economic return of the National Space Program of Ukraine. What is more essential is that Ukraine's experience shows how difficult it is to enter the international launch market even for a country with an advanced space program, and what little chance of success nations have which start their space efforts from scratch.

Former CIA Director R. James Woolsey in testimony to the Senate Government Affairs Committee in February 1993 defined two potential missile-related threats from Ukraine: a "willingness to sell" MTCR-prohibited technology, and the fact that the dual-use technologies used in space launch vehicles are a "real problem" as they present one of the areas where Ukraine can successfully compete with the United States.1 To deal with the proliferation threat, the U.S. Administration is persuading Ukraine to bring its missile production and trade into compliance with the MTCR. In dealing with Ukraine as a threat to U.S. launch providers, the Administration would more likely have been expected not to allow Ukraine to enter the U.S. launch market, and to protect domestic launch firms. Its decision to allow Ukraine to compete with U.S. launch providers may seem irrational. But is that really so?

1 Compiled by NCSEER staff from "Conclusion," page 12.
UKRAINE'S SPACE HERITAGE

Some American experts, immediately after the collapse of the Soviet Union, did not envisage the potential of Ukraine entering the world launch market, stating that "In the event of the effective dissolution of the CIS, what would remain [of former Soviet Space Program] is effectively a Russian space effort."² Various estimates, mostly those of Russian officials, were placing the Russian share of the Soviet space industry at 75 percent, 80 percent and up to 90 percent.³ Ukrainian officials, however, estimate Ukraine's share at about 40 percent of the "Soviet space complex's production capacity."⁴ The mere fact that currently U.S. launcher providers complain that Ukrainian launchers may put them out of business, and U.S. satellite manufacturers have signed a number of contracts with the Ukrainians, proves the later estimates more accurate.

Historically, most of the civil sector of the Soviet space program was in Russia, while a major part of the scientific and industrial space complex in Ukraine was involved in developing and producing the missiles which formed the backbone of the strategic forces of the former Soviet Union. The "Yuzhmash" Mechanical Plant in Dnepropetrovsk in Eastern Ukraine was the largest Soviet ICBM factory where the SS-18, SS-20, SS-23, and SS-24 missiles were built, and today, with its two million square feet of floor space, it is the world's largest facility of its kind.⁵ Also, "Yuzhmash", and affiliated with the "Yuzhnoye" Design Bureau, had been the principal Ukrainian facilities involved in the design and production of the Zenith and Cyclone launch vehicles, electronic intelligence satellites, and ballistic missile early-warning satellites and radars. The Zenith had been used to launch large, low-altitude, electronic intelligence satellites and also served as the strap-on booster for the Energia launch vehicle and the Buran shuttle. The first launch of the Zenith took place in April 1985, and there were 25 Zenith launches within the next ten years.⁶ The Cyclone booster, a derivative from the SS-9 and SS-18 ICBMs, is a three-stage launch vehicle, similar in performance to the Russian-made Soyuz rocket. The Cyclone has been in operation since June 1977, and has had 114 successful launches and four failures.⁷ According to Valeriy Shmarov, the Ukrainian Defense Minister, Ukraine has designed and produced over 400 spacecraft, including a series of Cosmos satellites, almost all of the Intercosmos series of satellites, and the Cyclone and Zenith boosters. All in all, over 100 Ukrainian enterprises and research centers had actively participated in design and manufacturing of space machinery since the beginning of the Soviet space program.⁸

The National Space Agency of Ukraine was established in 1992, and since 1993 the National Space Program (NSP) has been included in the country's budget. The NSP for 1993-1997 identifies the following areas as vital: 1) observation of the Earth from space; 2) development of space launchers, especially the Zenith and Cyclone launchers; 3) development of ground-based infrastructure.⁹ The NSP framework provided for the establishing of two scientific and technical
centers in Kharkiv and Dnepropetrovsk and the founding of the Ukrainian Space Center for Innovations and International Cooperation in Kiev.  

The country’s National Space Program received a favorable jolt in 1994, when Leonid Kuchma, who used to be "Yuzhmash" Director General for eleven years, was elected President of Ukraine. Kuchma clearly stated that Ukraine’s renunciation of ballistic missile production, and its curtailing of civil and military space programs, will have a negative impact on Ukrainian industry. The Presidential team has been composed of people devoted to the promotion of the National Space Program. Pavel Lazarenko, the first Vice Prime Minister, Valery Shmarov, the Defense Minister, and Vladimir Gorbulin, the National Security Adviser to the President and the Secretary of the National Security Council of Ukraine, share a background in the Ukrainian missile industry. All in all, about fifty percent of the most recent promotions in the Ukrainian government are people previously involved in the missile industry, mostly in "Yuzhmash", and they are devoted to the idea of developing the space sector in Ukraine. Developing a competitive space industry, is considered by the Ukrainian government to be of crucial importance, as it is believed that it will improve the very difficult economic situation in the country, promote other related sectors of the economy and contribute to Ukraine’s international standing.

**U.S.-UKRAINIAN LAUNCH DEAL**

Ukraine’s denuclearization dominated U.S.-Ukrainian negotiations in 1991-1993, leaving the missile proliferation threat from Ukraine with less attention. However, as soon as denuclearization was considered a done deal, bilateral proliferation-related talks shifted to Ukraine’s space sector. Despite the poor shape of the national economy in general, Ukraine has one of the most developed missile industries and space programs in the world. If faced with the situation of being unable to legally and securely profit from its industrial and technological missile-related potential, Ukraine may seek contracts with potential proliferants in the Third World. Political, economic, military, psychological and emotional factors, coupled with the lack of a comprehensive general export control concept, system, strategy or legal basis in Ukraine may contribute to missile proliferation.

Aware of the missile proliferation threat from Ukraine, the U.S. is interested in involving Ukraine in bilateral and multilateral agreements. A guaranteed share of the international space launch market could make the Ukrainian missile industry more controlled and predictable, and discourage it from illegal trade. Also, it would have been unfair to isolate the Ukrainian space manufacturing sector after requiring Ukraine to privatize state-run businesses. Admitting that Ukraine’s entrance to the U.S. market may cause losses to certain American companies, the Administration has not considered these losses as severe. Moreover, by orbiting U.S. communication satellites, Ukraine could promote the development of this sector of the American economy. In addition, the number of U.S. launch failures in 1995 was the highest since 1986, when the fatal space shuttle Challenger
accident was followed in succession by expendable launch vehicle failures, and industry customers pointed out the need for safer and less expensive launchers.\textsuperscript{12}

The U.S. National Space Transportation Policy signed by President Clinton in August 1994 placed severe restrictions on the use of excess U.S. ballistic missiles to launch government payloads but left open the issue of foreign missile assets. After a one-year heated debate with the space-related industries, on September 29, 1995 the Clinton Administration issued a long-awaited policy on the use of foreign excess ballistic missiles for space launch. Both White House Science Adviser John Gibbons and the president’s national security adviser Anthony Lake were among drafters of the policy. The Administration elected to review on a case-by-case basis requests to launch U.S.-made satellites on foreign launchers. The new policy stipulates that use of the converted foreign missiles be consistent with existing treaties, technology transfer rules and nonproliferation arrangements.\textsuperscript{13}

In fact, the case-by-case approach had been practiced by the U.S. Administration before the formal policy on this issue was shaped, and applied to the non-market economies like those of China and Russia. The agreements with China, signed in 1988, and with Russia, signed in 1993, established launch quotas and required that these two nations price commercial launchers on a par with what Western companies charge for comparable services. Under a six-year pact that expired December 31, 1994, China was allowed nine geostationary payloads. A new U.S.-China agreement signed January 27, 1995, gives Beijing the right to launch 15 geostationary satellites through 2001 at prices within 15 percent of those offered by Western firms. The U.S.-Russian agreement limited Moscow to eight geostationary satellites through the year 2000 at prices within 7.5 percent of what Western companies charge.\textsuperscript{14} The next in the line was Ukraine.

At the November 1994 summit in Washington, Presidents Bill Clinton and Leonid Kuchma signed an "umbrella" space agreement. The U.S.-Ukrainian agreement empowered the nations’ space agencies to collaborate directly on joint projects without having to consult constantly with their respective heads of state. Also, the possibility of Ukrainian astronauts flying on the U.S. space shuttles was discussed, although there was no language to that effect in the final document signed by the presidents.\textsuperscript{15} However, at that summit, Kuchma failed to win the White House’s authorization to compete for launches of U.S. satellites. By that time, neither the U.S. Administration, nor the U.S. space-related industry had considered thoroughly all pros and cons of such a deal with Ukraine. As Daniel Goldin, NASA Administrator, put it, "They [Ukrainians] have some outstanding technology. The issue is just having the Ukrainians understand our markets, and us understand their intentions."\textsuperscript{16}

Initiated by the "umbrella" agreement, the first round of negotiations on a bilateral launch pact took place in Kiev in late April 1995. The May 1995 U.S.-Ukrainian summit in Kiev stipulated the terms of negotiation, and left little doubt that Ukraine was about to be admitted into the club of nations offering commercial launch services worldwide. “Together we will enter into exciting new
ventures, such as commercial launch cooperation," President Clinton said in May 12 address at Kiev's Shevchenko University. However, the subsequent negotiations on the final terms of the U.S.-Ukrainian agreement were marked with a dramatic battle in the White House over the issue.

The disagreement centered primarily around the number of American-built satellites the Ukrainians would be allowed to launch to geostationary orbit. The negotiations on the Ukrainian accord coupled with Russia's pressure to rewrite the 1993 U.S.-Russian accord and raise the Russian ceiling to 20 launches or more scared U.S. launch providers. U.S. launcher manufacturers viewed relatively cheap Ukrainian launchers as an unfair threat to their survival. The U.S. firms have argued that their ability to compete internationally should not be sacrificed to nonproliferation goals.

As Brian Dailey, Vice President for Washington operations of Lockheed Missiles and Space Co., put it, "We must be very careful to ensure that through the arms control process we do not undermine the nascent [U.S.] small launch industry." Several U.S. companies led by McDonnell Douglas of St. Louis, maker of the Delta series of launchers, Orbital Science Corp. of Dulles, Va., who manufactures the Pegasus and Taurus rockets to launch small satellites, and Lockheed Martin Corp. of Bethesda, Md. were opposed to the Ukrainian deal. A congressional delegation representing Florida joined the campaign stating that the Ukrainian agreement would put U.S. launch providers at an "unnecessary and unfair" disadvantage, and asked the Clinton Administration to reconsider the planned pact with Ukraine. On the other side of the issue were U.S. satellite makers, led by Boeing Co. of Seattle and Hughes Space and Communications Co. of Los Angeles, who wanted increased access to foreign launchers and who, at last, proved to be the more powerful and influential.

Initially, the U.S. government had been planning to allow Ukraine to launch up to 22 geostationary satellites through 2001. Then the number was slightly decreased to 20 satellites, including a base number of eight satellites which could have grown to 12 if the market warranted, and another eight launches for the Boeing-led Sea Launch venture could have been added.

However, at the final stage of negotiation, the Sea Launch portion was increased, though not changing the total number of launches allowed to Ukraine. The final agreement initialed by U.S. and Ukrainian negotiators on December 14, 1995 in Vienna, and signed by President Kuchma and U.S. Vice President Gore on February 21, 1996 allows Ukraine to sell up to five geostationary launches on its Zenith and Cyclone boosters through the end of 2001 and one additional launch if market demand grows. The agreement also allot 11 launches to the Sea Launch venture with the possibility of three additional launches based on launch demand. In late January 1996, the U.S. and Russia concluded a deal that allows Russia to orbit at least 16 and as many as 20 commercial payloads through the end of 2000, depending on launch market conditions. With the Ukrainian and Russian deals signed, the U.S. government has carried out the first part of its "transition policy", which, according to an Administration official, was defined as 'Get Ukraine in, bring Russia up to parity.
with everybody else, and start working to the elimination of quotas sometime past the turn of the century.23

SEA LAUNCH

Participation in the venture dubbed Sea Launch is probably the most ambitious of Ukraine's aspirations. The idea of a space launch from a floating launch pad emerged at the "Yuzhnoye" Design Bureau in mid-1970s, when the first Zenith was being designed. However, the costs of the project which constituted about 500 million rubles, made it unacceptable at that time.24 In early 1990s, the project was reinitiated by the Russian "Energia" Design Bureau which started negotiations with Ukrainian, American and European companies. A technical assistance agreement that paves the way for exchanges of information between the participating companies was signed April 27, 1995, and on May 4, 1995 the Sea Launch partners signed an agreement in Seattle to mark the official beginning of the joint venture. Signing the pact were: James Noblitt, president of Boeing Commercial Space Co.; Deitrich Schnitler, president of Kvaerner A.S. of Oslo, Norway; Yuri Semenov, president of "Energia" Design Bureau of Kaliningrad, Russia; and Yuri Alexeev and Stanislav Konyukhov, both directors general of "Yuzhnoye" of Dnepropetrovsk, Ukraine.25

Boeing is the lead investing partner and will serve as overall system integrator. It has taken a "customer-end approach" to determine what the satellite producers want from launch service providers. "Yuzhnoye" will supply Zenith-2 CL rockets, and "Energia" will provide an upper stage engine for Zenith. Kvaerner will modify the 30,000-ton oil rig that will serve as the launch platform and build a command ship to tow the launch platform out to an equatorial launch site south of Hawaii.

According to Stanislav Konyukhov, Director General of "Yuzhnoye", Zenith has been chosen as the venture's launcher because of its unique technical performance. Its launching does not require personnel at the launch pad. All pre-launch stages, like mounting the rocket on the rig, fueling, and filling with compressed gases, can be done automatically, and Zenith can be launched through remote control from the command ship. Another attraction of the Zenith was its original low price. Although the exact original price had never been openly published, some Ukrainian sources stated that it could have been from 30 to 50 percent below the price for the French "Arian-4" booster, which is about $110 million.26 However, the U.S.-Ukrainian launch accord has left Kiev with no hope of trying to enter the world's geostationary launch market through selling a large number of launchers for low prices.

Having felt the potential threat from the negotiated agreement on price and quantity restrictions for Ukraine, Boeing started asking the U.S. government for an exemption of the Sea Launch from restrictions immediately after the May 1995 agreement on a joint venture was signed. "Our contention is that this is a U.S.-based, U.S.-led launch services company, and the quotas they have
established for non-market economies do not apply," said Allen Ashby, vice president of business
development at Boeing Commercial Space Co. "The cost of the launch is not just the rocket - it is
the whole infrastructure. It is the launch service that you have to provide; it is the launching pad," he added.27 The major Boeing concern was whether the U.S. government would permit Ukraine to conduct enough launches to make the whole venture commercially viable. However, although the U.S. Administration decided to fold the Sea Launch into the U.S.-Ukrainian agreement, now Boeing officials say they can live with the 11 and possibly 14 launches they have been allowed.28

For Sea Launch, as for all kinds of new and unique ventures, the economic return is a questionable issue. The investment required for the venture is estimated at $400 million to $500 million. Boeing and Kvaerner, which are responsible for the financial issues of the venture, have already committed a combined total of $15 million.29 In December 1995, Hughes Space and Communications Co. of Los Angeles, the company that builds more than a half of the world's commercial telecommunications satellites, finalized a commitment to purchase at least 10 launchers. The Hughes deal, the Sea Launch's first customer, worth about $10 million with options, provided Boeing and its partners with the financial impetus to proceed.30 However, there is still the question as to whether the international launch market is robust enough to sustain a new-comer. A study, prepared in mid-1995 by the U.S. Department of Transportation's industry-led Commercial Space Transportation Advisory Committee, predicts there will be between 26 and 33 commercial satellite launches to geostationary orbit in 1997. The U.S. launch providers, like Lockheed Martin, subscribe to a lower number, while satellite providers, like Hughes and Space Systems/Loral of Palo Alto, Calif. believe the higher figure is correct.31 According to Sea Launch President Ronald Olson, the joint venture hopes to launch its first satellite in February 1998 and at least one other launch that same year, and ultimately hopes to increase to 6-8 launches a year.32 Boeing officials believe that an average launch rate of five to six per year, including some dual satellite launches, will be enough to allow Sea Launch to turn a profit. From the Ukrainian perspective, the Sea Launch venture is to be oriented to the U.S. market, as well as to Arab countries, and its economic return will take seven years at the most.33

Boeing will hold the largest share of Sea Launch, 40 percent, while Russia's "Energia" will hold a 25 percent share, the Kvaerner Group a 20 percent stake, and Ukraine's "Yuzhnoye" 15 percent. The Russian share is larger than the Ukrainian because 60 percent of the Zenith's components actually come from Russia, including "Energomash"-supplied engines.34

GLOBALSTAR

Another Ukrainian success is entering the U.S. low-earth orbiting (LEO) market. Space Systems/Loral of Palo Alto, California, and "Yuzhnoye", agreed on May 6, 1995 to use three Zenith rockets to lift 36 Globalstar satellites into low-earth orbit. Space Systems/Loral designs and
manufactures large, high-powered satellites for telecommunications and environmental applications.
and is building the satellites for Globalstar, a planned constellation of 56 spacecraft designed to
provide mobile telecommunications services worldwide with an estimated cost of $2 billion. It is
scheduled to commence operation in 1998. Globalstar officials said they chose Zenith because it can
deploy 12 satellites at a time, while McDonnell Douglas Delta 2 which is contracted for up to nine
Globalstar launches, can lift only four. Each Zenith will carry 12 satellites in a configuration
composed of three tiers of four satellites each, allowing each craft to be deployed sequentially - a
method derived from multiple independent re-entry vehicle technology developed for intercontinental
ballistic missiles. Globalstar would not disclose the value of the launch contract, just saying that the
agreement with Ukraine gives it "access to reliable and moderately priced launch vehicles." But
U.S. government sources estimate that Zenith-2's price tag nears $40 million per launch, compared
to the $90-100 million cost for a Lockheed Martin Atlas IIAS, which has about two-thirds the
payload capacity. Zenith can carry 30,300 pounds to LEO, whereas the Atlas IIAS can haul 19,050
pounds. The Loral-"Yuzhnoye" contract calls for Loral to pay Ukraine cash for the launchers, and
to provide the technical expertise and ground-network development for the dated Ukrainian
telecommunications system.

COSTS AND BENEFITS

Despite the obvious fact that the breakthrough to the world space launch market is Kiev's
success, the economic return is still vague and unclear. According to Alexander Negoda, NSAU
Director General, profits can be derived from the operation of communication satellites, the transfer
of space technology and equipment, and launching foreign cargoes from Zenith and Cyclone rockets.
Also, Negoda believes that the current low cost of producing space technology in Ukraine, and the
opportunity to export it at world prices will enable Ukraine to recover expenses in three to four
years. NSAU Deputy Director General Valeriy Komarov believes that the U.S. market is
advantageous for Ukraine due to the fact that new global space communication systems are being
created, and the latitude of U.S. aerospace companies is restricted.

The Ukrainian press has mentioned that Ukraine expected to use Zenith launchers for 6-12 out
of the 70-80 launches Western countries carry out annually, which constitutes about one tenth of the
international space launch market. These expectations were echoed by the U.S. Department of
Transportation, which stated that the potential market for Zenith launchers ranged from 5 to 10
launches a year between 1997 and 2003. However, these estimates were made before the U.S.-
Ukrainian launch pact was signed. Given the total number of 20 launches allowed to it, beginning
from 1996, Ukraine can launch 3-4 rockets with U.S.-made payload annually up to the end of 2001,
which is far below what was expected. Sea Launch is planning to launch 6-8 Zenith rockets, but
beginning in 1999. The number of annual launches could be increased by launching low-earth orbit
satellites which were not included in the U.S.-Ukrainian pact and will be handled separately. However, this is unlikely to change the situation drastically, because the geostationary market is still dominating the launch business, and competition with U.S. firms launching LEO satellites will be very tough.

According to Eduard Kuznetsov, NSAU Deputy Director General, space companies will pay Sea Launch $50 million for each commercial launch of a satellite, of which Ukraine will receive $7.5 million. Under the most favorable market conditions, Ukraine could launch 14 Zenith rockets carrying one satellite at a time by the end of 2001 and make $105 million, and even more with more than one satellite aboard. The total planned number of Sea Launch launches of close to 60 could increase the above mentioned Ukrainian earnings four times in the long-term run. Orbiting three Globalstar satellites could give Ukraine another $120 million. Should Ukraine get all it expects to get, its National Space Program would turn a profit as early as the end of the century.

However, there are at least two major threats which may undermine the economic prospects of Ukraine's space efforts: the potential for failure of the first Zenith provided for the Sea Launch or Globalstar ventures; and competition with U.S. and Russian launcher providers.

Under the U.S.-Ukrainian launch agreement, if the market averages 24 launches in 1996-1999, Ukraine can fly up to 5 U.S.-built satellites itself and Sea Launch can send up to 11 geostationary satellites. If there are 24 or more launches per year on average during the same period, Ukraine can fly up to 6 satellites, while Sea Launch has the authority to launch 14. This composition is unfavorable for Ukraine, since three fourths of the allowed launches would involve a great number of foreign components which have never performed together with the Zenith booster, therefore increasing the risk of failure. (An example of the threat of failure--not necessarily at Ukraine's fault--is the Russian Raduga satellite's failure to reach geostationary orbit after the launch of the Proton-K rocket from Baikonur on February 19, 1996. Sources said the vehicle failed after the Block DM upper stage did not ignite for its scheduled second burn. The Block DM upper stage will be used on the Ukrainian Zenith booster in the Sea Launch venture.) The Office of Commercial Space Transportation (OCST) derives its authority over this international venture because Boeing is the U.S. corporation that has the critical role in the project. OCST will inspect Sea Launch hardware and procedures to ensure safety but it can not guarantee the success of launches.

It is still unclear whether the Zenith involved in Sea Launch will be insured, since Ukraine may proceed with the practice of not placing insurance on its launchers and satellites, as Russia and China do. However, Ukraine's market-economy partners will definitely seek insurance at least on what they are contributing to the project; satellite providers will also insure their satellites. It might be difficult to place insurance on the first launch of the Sea Launch rocket. Though the constituent elements of the venture seem viable, they have never performed together as a single unit, and this fact discourages insurance underwriters. If the first launch fails to bring a satellite to
geostationary orbit, it would be extremely difficult to insure another Sea Launch satellite, and competing launch providers would have the advantage for some time, at least until the second launch proved to be successful. If the second launch is a failure as well, that would have significant repercussions. The failure of the first (or any other) launch causing destruction of the launch pad and/or command ship would have the same effect. For Ukraine that would mean the loss of 75 percent of the allowed launches of U.S. payloads, and the same percentage of expected earnings, as well as a poor reputation in the world space market.

Ukraine has already experienced the negative effects of failure to launch foreign satellites. On August 31, 1995, the Ukrainian Cyclone-3 rocket launched the Chilean FASat-Alfa remote-sensing satellite which was riding piggyback on a Ukrainian SICH-1 marine research satellite. The Chilean satellite failed to separate from the Ukrainian one, and as a result has become inoperable, while the SICH-1 has been functioning. Although Zenith's launch was successful and the cause of separation failure is disputable, the Chilean Air Force has since preferred to search for a launch provider other than Ukraine, and has asked the U.S. Air Force to find a cheap ride to space for another satellite, called FASat-Bravo, which is to replace the lost FASat-Alpha.

The Chinese case even more explicitly shows how detrimental the failure of the venture's first launch might be. Under contract between the International Telecommunications Satellite Organization (Intelsat) of Washington and Great Wall Industry Corp. of Beijing, Long March rockets were scheduled to orbit three Intelsat satellites in February 1996, July 1997, and March 1998. Making its first launch on February 15, 1996, the Long March 3B booster crushed seconds after liftoff, and the Intelsat 708 satellite was destroyed. The Chinese asked Intelsat not to make any quick judgments, or at least cancel one of the future launches. However, pressure from the insurance industry, as well as the commercial pressure to add new satellite capacity quickly, persuaded the Intelsat's Board of Governors to unilaterally cancel all contracts with China in late March 1996 and to begin negotiations on using Lockheed Martin Corp. Atlas rocket to replace Chinese vehicles. Later on, two other Long March customers - EchoStar Communications and AsiaSat - have canceled contracts with China.

Another threat to Kiev's high expectations could be underestimation of the competition in the launch market. Pressure from launch providers on the U.S. Administration at the time when the agreement with Ukraine was being negotiated proves the point. Although it may seem that satellite providers won the battle with launch companies over the Ukrainian deal, that does not mean that the Administration ignored the concerns of domestic launch firms. The composition of Ukraine's quota serves as evidence that the Administration had taken into account the interests of U.S. launch providers. Had the Administration yielded to Boeing's pressure and excluded Sea Launch from the total number of launches allowed to Ukraine, Ukraine's quota for ground-based launches could have been higher, thus threatening U.S. launch firms. By including Sea Launch in the agreement, the
U.S. negotiators have provided Boeing with the desired number of launches, and consequently, decreased Ukraine's quota of ground-based launches, thus easing competition for U.S. launch companies.

Besides, there is no certainty that Sea Launch competitors will allow it to orbit as many satellites as it plans. For example, some Russian experts do not share the Sea Launch partners' hope for a quick economic return from the venture. "On the technical side it [Sea Launch] is brilliant. But in all my calculations of Sea Launch, the rate of return drops to zero," said Alexander Lebedev, Deputy Director General of Khrunichev State Research and Production Space Center. "To make their business plan attractive, they must do a lot of launches in a short period. This would mean they would have to win half of the available market, but that is impossible given the competition," Lebedev said.50

Low-earth orbiting satellite systems are likely to increase their presence in the commercial launch market in the next few years, according to the FAA's Office of Commercial Space Transportation.51 Presumably, with demand for services such as fax, paging and mobile telephone communications soaring, business consumers and the general public will pay for the ability to tie into such services just about anywhere on the globe via satellites. This could give Ukraine an opportunity for additional launches, since the U.S.-Ukrainian accord's language addressing LEO launches does not include specific numbers or price restrictions. However, the U.S. commercial launch industry and the U.S. Administration are taking the potential market competition seriously. Provisions to ensure that U.S. launch providers are given fair consideration for future LEO launch business are contained in the Ukrainian pact. Specifically, the U.S. reserves the right to look at the factors considered in launch vehicle selection if 51 percent or more of the payloads in any single LEO constellation are marked for launch by "economies in transition."52 The Globalstar agreement with "Yuzhnoye" that covers more than half of Globalstar's 56 planned satellites may be a case in point. Today, three U.S.-led ventures - Iridium, Globalstar, and Odyssey - are competing in the LEO launch market, and Ukrainian launchers will have to compete with at least U.S. Delta 2, Russian Proton, and Chinese Long March boosters.

CONCLUSION

Ukrainian government and industry leaders are very sensitive to the political and economic aspects of the National Space Program, and have made it clear that they will not yield to Western pressure to give up its missile industry as they did with nuclear weapons. At the same time, Ukraine's denuclearization has shown how effective not only "sticks" but also "carrots" can be. Cooperation with the United State and other Western nations could give Kiev the sense that Ukraine's advanced missile industry has been recognized and respected, as well as that such cooperation could bring more economic profit than illicit trade with "rogue" nations. The U.S.
Administration's decision to allow Ukraine to enter the U.S. launch market is in line with its more general policy of supporting economic reforms in Ukraine. Also, though causing certain inconveniences to some domestic launch firms, the U.S government has provided satellite manufacturers, a traditionally powerful lobby, with a larger choice of launchers. At the same time, however, it has provided terms for fair competition between Ukrainian and domestic launch providers.

Ukrainian aspirations for collaboration with U.S. space industries are much more substantial than for those with other countries, and a share in the American market is a major goal of the National Space Agency of Ukraine. The U.S.-Ukrainian launch agreement contains similar terms and conditions to pacts with Russia and China, which make Kiev feel satisfied and even flattered. The 1994 "umbrella" agreement between Presidents Clinton and Kuchma provides for joint efforts in space exploration in the future. Today, it seems premature to go beyond a very rough evaluation of the expected economic return of the National Space Program of Ukraine. What is more essential is that Ukraine's experience shows how difficult it is to enter the international launch market even for a country with an advanced space program, and what little chance of success nations have which start their space efforts from scratch.
ENDNOTES


3. Ibid.


16. Ibid. p.27.


35. It is planned to orbit 48 operational satellites and 8 spares. Some sources may refer to the constellation of 48 satellites, counting only operational ones.


44. Ibid., p.46.


46. Ibid. February 26, 1996.

47. See interview with John Vinter, President of International Space Brokers Inc. in Space News. March 11-17, 1996, p.22.


52. Ibid., p. 403.