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SPACE NON-COMMERCIAL PROJECTS INNOVATIONS INITIATING NEW MARKETS AND SOCIAL DEVELOPMENT

Abstract

A new space strategy of the world community should emerge as a result of strategic planning for the period 2010 – 2040. Commercialization of near Earth space, establishing permanent scientific and industrial stations on the Moon, first manned flights to Mars are planned on the background of advanced horizontal take-off and landing space vehicles development, usage of nuclear reactors as space energy sources and nuclear engines for interplanetary flights. A new approach to future space projects is a proposed concept of developing technology spin-off, beginning from the moment of technical assignments to the project. Some other commercial proposals are discussed to make space projects attractive for investors and politicians who take decisions. Establishing a World Space Agency is also proposed.

Introduction

The world community is now before the choice of different ways for its own further development. It is quite non-uniform by its social and economic level: one “gold billion” is quite far from 2,5 billions people living below the level of poverty. And those who are between them could scarcely be called satisfied. In the period from 2010 and 2030 a new strategy of the world community should be developed and partialy realized. One of the inalienable components of this strategy should be a space development strategy. Financial, economic and social losses caused by the absence of such strategy in the previous 30 years happened to be too high not to repeat again strategic mistakes paid by billions of people though major part of them are far from this idea. Emerging a new space strategy is a challenge like other challengers which were found in XXI century. But space strategy as the goal to be reached has some advantage before other challengers: behind it stays a world team of excellent researchers and managers ready for action just now. Only political decisions are needed.

1. Technical assignments to space projects of the 60-ies and their political and economic roots.

Space racing In the 60-ies was a reflection of fight between two world political systems, represented by the United States and the Soviet Union. So technical assignments to space projects were defined by a list of requirements with a definite priorities: to realize the project before the competitor, to provide safety and reliability of all the systems, to make it as cheap as possible, to make it useful for applied branches of industry if possible.

There was a considerable difference between the latest above mentioned goal in Soviet and American projects. Practically all the Soviet projects were expendable, while Apollo project seemed to have a sensitive technological and financial output. Now it is quite difficult to estimate authenticity of data published in the 80-ies, but Soviet sources reported that an efficient use took place of spin-off process and commercial officer activities in procedure of the technology transfer. The United States in ten years after manned flight to the Moon had revenues about 130 billions dollars while taxpayers expenditures to the project were 25 billions dollars. Perhaps the results are exaggerated a little bit but it is impossible to deny efficiency of technology transfer mechanisms which the US had thirty years ago and still use up to now. Experts in the Soviet Union ascertained efficiency of such mechanisms in the United States as well as recognized their absence in the Soviet Union.

First sputnik and first space flight of Yury Gagarin were a challenge to the United States, so the first manned flight to the Moon became a response to the Soviet Union. Era of balance in space came and when the United States closed the Moon program in 1972 before the schedule it became clear that both the US and the USSR were not going to spend much money for space development in XX century.

2. Globalization and new requirements to space projects.

Disintegration of the world socialist system created conditions for emerging “new wealth”. In the middle of the 90-ies the leading TNC initiated the process of globalization and declared themselves as global companies. Russian professor M. Osmova [1,2] defined globalization as the process of redistribution of political and economic functions between the state, the transnational company and the international organization. At the same time globalization means emerging of hypercompetition. So for space projects in the era of globalization it means three new factors each of them connected with global companies behavior: new wealth, new degree of freedom for global companies and hypercompetition in space.

A half a century ago only two superpowers could make definite steps for development of space. Now the United States, Russia, China, European Union, India and Brazil are members of space club, and

a few other countries – Iran, North Korea, Pakistan, Israel and perhaps some others are close for joining this club. These countries look at the prospects to participate in the first manned flight to Mars, to join the teams for development the Moon resources, to commercialize near Earth space.

To make basis for these projects realization a new launchers capable to deploy heavy loads on the Earth orbits should be designed and manufactured. Globalization demands that such problems should be solved by a group of countries and such group should represent the whole world community. This concept dose not close the door for private initiatives and global companies activities in space. It only reminds that the role of states under conditions of globalization remains as high as before.

But globalization and new level of financial and technological development demands new requirements to space projects: a wide and efficient technology transfer, evident influence on development of other branches of industry and sector of services, visible shifts in social development as a result of these projects realization.

3. Competitive technologies and monopolization of the market.

If to ask, what country is more consecutive in designing and carrying out space strategy, the answer will be not very optimistic for developed countries, since the only country having a long range strategic planning in space development is China. Other well known space powers have a lot of general ideas and plans which are not always financially supplied and often don't have definite time of realization.
It happens since global top-managers still didn't catch the idea that next three decades will be defining in the design of the global community strategy and future world economy structure for the period coming far beyond the frames of XXI century.

The world now full of competitive technologies. Major part of know-haw, patents and licenses belongs to US global companies and practically are not used in manufacturing process since the world market is monopolized. In the year of 2001 Russian company Neftemash Design Bureau, a small enterprise supported by a large trade company, offered to the oil market a new model of oil pump, which length was three times less than existing pumps. But the main competitive advantage of a new model was high adaptation to the pressure in oil layers. The new pump was developed by a team of designers who had been created turbo-pump aggregates for soviet space launchers a few decades before. There are about one million oil wells in the world, ten per cent of them are located in Russia. But the largest Russian plant manufacturing oil pumps as well as two largest in the world American plants of the same profile didn't pay attention to this innovation because leading oil companies preferred to exploit old technology.

The first and basic by its nature step in a new period of space development is to create launchers to lift heavy loads to low Earth orbits. Space ships for the regular flights to the Moon and Mars should have masses 500 – 1000 tons. They could be assembled in orbit using standard components of 20 – 100 tons.

There are at least two ways to do it. First way is using heavy launchers like Energia or Angara. The second one is to use more efficient way by means of heavy air carrier with the space vehicle on board, playing the role of the second stage. Ten or twenty years later the air-space one stage vehicle will emerge, but for the nearest half a century or even more heavy launchers with rather high cost of one unit of mass in orbit will be used to deploy sections of the inter planet space ships.

Before getting down to this stage of new space technology development it is necessary to create a new international universal system of space standards. This thesis does not require any substantiation, it is enough to remind a joint American – Soviet Project Souz - Appolo, which included development of special device for docking and reliable passage from one space ship to the other. It took more than a year while the Project could be carried out in a few months after official decision if the system of standards was unified.

4. Transfer of technologies mechanisms modification under conditions of globalization.

The main way for decreasing time of investment capital return is use the whole spectrum of technology transfer mechanisms. But initiation of technology transfer procedures should be made at the moment of taking decisions on the space project initiation. In this case a challenge will emerge before a designer: to develop not only some functional element but also its application in some activities of the world community, including first of all market demand.

Andrey Dushkin, sun of well known Soviet rocket engines designer Leonid Dushkin, used the profile of channels for ejection of fuel and oxidizer into combustion chamber as the basis for modification in the design of anti-fire equipment, which happened to be the best in the world. Now tens of countries are buying it and a version appeared for use against fire in underground trains where it is efficient without switching out the voltage on the contact rail.[3] It is a rare very successful example of commercial technology transfer from space technology to civil usage. Time between invention of basic technology and its application in the civil sector of economy happened to be about 40 years. Now it has to be used in space and on the Earth practically at the same time.

There are only two places in the United States where transfer of technology is carried out with the use of efficient procedure. If an inventor has enough money he flies to Silicon Valley and skillful commercial officers help him to present his new technological good at New York Stock Market. One more such place is in the North-East of the United State, but it is not such efficient as Silicon Valley. All the other countries, except may be Japan and partially China, to some extent continue to observe how it is done in the United States. Globalization means a new opportunity for all the countries. But it does not mean that new opportunities will come themselves. Each space power should lead a corresponding national technological policy and to make their companies to be competitive in advanced technologies. Otherwise powerful developing countries will reach competitive advantages in space racing which starts now again.

5. Initiation of social programs under influence of advanced space projects.

This direction of advanced space projects application can be divided into two branches – emerging new branches of industry and generation of social programs focused on unsolved keen problems of the world community. The first branch includes emerging of new materials and new operational procedures used in medicine on the basis of nanotechnologies, new methods of recognizing appearances which can be used not only in the design of instruments for space flights and military activities but also for solving a range of biological, nature protecting and providing safety problems.

Space powers are located at different levels of development in the field of social supply for population of their own countries. For example for Russia active participation in space projects means first reanimation of manufacturing and high tech industries, then emerging principally new branches of industries. Besides, Russian TNC, like Chinese and Indian corporations will join western countries in the process of creating global innovation networks using advanced working force in tens of developing countries, promoting economy of these countries for developing. For such countries as the United States or Japan it will create a real opportunity for change relationship between industrial production and sector of services activities at the expense not returning back enterprises exported to other countries before but to establish new branches of industry at their territories or to make restructuring of their industry, deployed it throughout the world.

New space projects will open opportunities for social programs in the least developed countries. It can not happen without a special strategy together with transformation procedures, accompanying realization of space projects of XXI century. Such strategy should be based on recognition of deep connection of space development and improvement of social environment on the Earth.

6. Displacement of break-even point on the curves of expenditures and revenues and a challenge of new social mentality improvement

Though a new stage of space development demands a serious progress in three fields – technology transfer, direct and indirect influence on industrial structure, connection of new space projects with positive shifts in social development. But only one of these fields, technology transfer, made just in time of emerging a new advanced technology, may really lead to displacement of a break-even point on the curve expenditures and revenues. But there is one more instrument to strengthen this trend. Mass media has become a factor, arising enthusiasm and alarm simultaneously. That is why most skillful mass media experts should take part in realization of such projects and their role in shifting a break-point on the curve expenditures and revenues may happen to be much higher than it could be imaged.

A serious obstacle on the way of realization of theses strategic plans is mentality of politicians and even businessmen who were brought up in the age of the first space racing and transferred their notion to the next generation. It is possible virtually to divide all the people in two groups - those who made it and those who observed and practically used. It is the second group of people who should become a focus of those who would like to change their mentality. It is very difficult to apprehend globalization for people who do not like to move over the world, who are not inclined to comparison and analysis. It was apprehended in one moment by those who worked in space industry. These people caught the idea at once: time came for new steps in space.

Nevertheless, a long and heavy fight is expecting those who will try to open a new stage of space development. Arguments they will be offered: no one global problem is not solved – poverty, hunger, energy deficit, protection of environment, - and instead proposing a new solutions you propose a new expenditures which will do nothing to the world community. The only efficient answer to these objections is displacement of the break-point to the beginning of expenditures and revenues curve.

7. Contradictions of corporate, national and global governance and an efficient instrument for a new step of space development.

New space projects promise state orders to corporations, new political and economic dividends to the states, more smooth but noticeable benefits for the world community. At the same time next additions of “new wealth” at the expense of space projects will surely cause serious contradictions between all the actors of space activities. To find the way for solving arising problems a new international organization should be established - the World Space Agency whose members could become countries capable to launch objects into the Earth orbit.

The main functions of such an Agency could be development space international standards, general strategy of space development, space navigation and preventing collisions of space vehicles, programs of space technology transfer and social development, regulation of business activities in space, space law development and a number of other functions. European Conference on Space Sciences could become an initiator of establishing the World Space Agency and dependently on approach to founding it – to become one of the constitutors.

The World Space Agency as international organization created after the global financial crises should be independent and not to carry all those political, economic and social faults which are typical for the post Second Word War system. So a space strategy of new Agency should be elaborated in correspondence with the world community strategy for the period 2010 – 2040 and up to the end of the century. The global financial crises will be over by the year 2014 as pessimistic but very experienced sources say, but by this time the Agency should be ready to function in all the azimuths.[4]

Conclusions

1. The world community is now before a challenge – oil and gas peak demands urgently hydrogen motor fuels and fusion reactor for electricity and heat production, the world financial system seems to become archaic, new gigantic economies are close to become competitive to world national leaders, state and corporative stocks of advanced technologies which are not used practically are overflowing. It is high time to launch a new stage of space development with new demands for space state orders and practical results of such projects for commercial and social development.

2. Space projects state orders in the period of 2010 – 2040 should foresee a wide complex of economic mechanisms – spin-off, commercial officers activities in technology transfer processes, special state measures, mass media involvement and so on, - providing shifting of break-even point (when expenditures are already balanced by revenues) to the beginning of the investment process.

3. For several countries, first of all for Russia, space projects state orders should obviously include necessity to foresee influence of such projects on creation and development of manufacturing enterprises of high tech products.

4. New stage of commercial development of near Earth space, constructing permanent scientific and industrial stations on the surface of the Moon, first manned missions to Mars – should be accompanied by sensitive shifts in realizing large scales social projects, functionally connected with space flights not only in the field of technology, but also in management and organizational mechanisms as well as in the wide use of services environment including mass media activities.

5. Three steps should be made in development of rocket engines in XXI century: advanced thrust systems should provide horizontal take – off and lading of orbital space vehicles, a wide use of nuclear energetic reactors as sources of energy in space and nuclear engines for interplanetary flights, fusion reactors energy sources for production in space and other planets as well as fusion engines [5] at more distant periods of time. Each of this steps has definite commercial advantages and may be used for space business operations.

6. New problems, arising before the world community in the field of outer space commercial development at the stage of transfer from carbon society to fusion and hydrogen society and from post second world war obsolete world financial system to a system reflecting improved global political and

economic structure, demand serious changes in the world governance quality corresponding to personal interests of a human being, strategic interests of corporations and all the countries in space.

7. The time came to establish a World Space Agency – independent international organization presented by countries capable to launch objects into Earth orbit. Such organization could solve such problems as introduction of space standards, develop a space development strategy, promote business activities in space, provide a use of technology transfer mechanisms and obtaining social dividends from space projects, modify and widen space law and solve other problems emerging at new stage of development.

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