European Space Policy
(1975 - 1988)

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TO MY PARENTS

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DECLARATION

Certified that the dissertation entitled 'European Space Policy (1975-1988)' submitted by Sri. Beerum Sridharnath in partial fulfilment of the award of the degree of Master of Philosophy(M.Phil) in Jawaharlal Nehru University, is a product of the student's own work, carried out by him under my supervision and guidance.

It is hereby certified that this work has not been presented for the award of any other degree or diploma by any university in or outside India and may be forwarded to the examiners for evaluation.

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PREFACE

The study of contemporary international relations cannot ignore the phenomenon of scientific and technological revolution (STR). while politics is thought of as an art and science of government, science and technology is increasingly seen as defining or complicating the substance of international relations and, together constitutes a growing influence on the structures and methods through which the politics among nations is decided and controlled. Rapid technological developments - military, industrial and communications - have reduced the world to a global village. Space technology, a vital component in the STR has a dominant role in forging this linkage. It is in this context that a detailed study of European Space Policy is being taken up.

In the post-war era a thoroughly devastated Europe was aided in its recovery by the US' European Recovery Programme. But by the time of its recovery in 1952, a renewed confidence of Europe coupled with the wide technological gap between the Euratlantic partners led to European regional initiatives in a variety of functional areas to close such gap. The European Coal and Steel Community (ECSC), the European Atomic Community (EURATOM), the European Economic

Community (EEC) and the European centre for nuclear research (CERN) were instances of such functional cooperation on a regional scale. With the dawn of space age in 1957 space emerged as an issue area in the international technological relations.

The European Space Agency (ESA) is a recent addition to the faimly of regional organizations in Western Europe in their efforts to foster a European integration. Established on 31 May 1975, it encompasses the activities previously conducted by the European launcher Developement Organization (ELDO) in the development of launch rockets and the European Space Research Organization (ESRO) in the construction of scientific satellites. It is composed of 12 member states : Austria, Belgium, Denmark, France, Italy, The Netherlands, Norway, Spain, Sweden, Switzerland and U.K. Further, Canada participates in some programmes through a cooperation agreement.

The specific points of emphases in ESA's agenda concern space science and research; space transportation; satellite capabilities; and industrial effectiveness. The ESA envisions developing the capabilities for working in space for scientific and industrial purposes through the columbus space station programme in collaboration with NASA. The development of

Ariane launchers and the French proposal for Hermes spaceplane cater to the transportation needs in space. The satellite capabilities are meant to broaden the technological base in astronomical research, earth observation and telecommunication research. Industrial effectiveness is seen as a positive fallout - spin off - of this space infrastructure programme resulting from enhanced skills, competitiveness, and technological innovations through collaborative ventures. To consolidate the space science and research, ESA adopted the long-term programme 'Space Horizons 2000'.

In the long-term orientation of ESA, the 'Columbus programme', the 'Araine' launcher programme, and the 'Space Horizons 2000', assure and consolidate European access to manned and unmanned spaceflights. It provides a focus for a pattern of industrial consortia among different national aerospace companies and their contribution to translating scientific and technological achievements into market responsive programmes. In a wider political context this would signify a striking signal of Europe's will to assert itself and to bring about the greatest possible extent of European independence without jeopardising the Euratlantic cooperative relationships.

The technology politics interface which forms the basis of space policy is discussed in the first chapter. In answering the question, why study space policy at all? It examines the space politics in a global context; the UN and space law, offering a general perspective of the space policy. The second chapter traces the origins of European space policy focussing on the push and pull forces exerted by the Alliance partner, the US. The first phase of the European space policy starting with the formation of ELDO and ESRO, until the emergence of ESA in 1975 is covered in this chapter.

The third chapter deals with the structural configuration of ESA; its budgetary principles concerning the mandatory and optional programmes; and the programmes themselves. It highlights the broad harmonization of national space policies beneath the veneer of European space policy, with an independent character.

Continuing with the theme of independent, functional, and peaceful character of European Space policy, the fourth chapter distinguishes it from the superpower space policies which are characterised by their association with national security purposes. Nevertheless, on the commercial front the ESA emerged as a competitor to the superpowers in launch services, communication satellites and other related services,

such as the remotely sensed data. A major development in the 1980's was the American Strategic Defence Initiative of 23 March 1983. As a conjunction of strategic, technological and political interests in space it created a new context and also introduced a new content in space politics. However, in tune with its basic principle of of pursuing the space research for peaceful purposes the European EUREKA initiative responded to the technological challenges posed by the SDI. This chapter deals with an analysis of the European Space policy in relation to the first league space powers (superpowers) and the third league nations comprising of the developing countries, with special reference to Indian Space Policy.

A perusal of literature on Western Europe reveals a traditional emphasis on European politics and arms control themes. Unlike the studies on European community which have been largely dealt within the framework of regionalism and international relations there has been an inadequate emphasis on the study of European space policy. Given the absence of major studies on European Space policy this study required a heavy dependence on diffuse material.

The choice of this topic grew out of my interest in 'European Advanced Technology' - a paper that I had opted for as part of my course - work. At this point I express

deep gratitude to my supervisor DR. CHRISTOPHER SAMRAJ who not only helped give shape to this idea but also had been a constant source of encouragement and critical suggestions at various stages of research. I also thank PROF. H.S. CHOPRA for his encouragement. Deserving special mention is my friend Vinayak, discussions with whom provided useful insights, and Venkatadri whose moral support has seen me through the study. My thanks are due to Muralidharan for his typing assistance. Of joy and support has been the regular correspondence with my siblings Nivi and Vinni.

B. Sridharnath.

Delhi, 21 July 1989 (B. SRIDHARNATH)

CHAPTER - I

INTRODUCTION

CHAPTER - 1

INTRODUCTION

Before developing an analytical framework for the study of space technology in world politics it would seem necessary to dwell upon the meaning and function of technology and highlight its specificity vis-a-vis the distinct West European industrial culture. Also it must be stated that modern technology— the harmonious association of science, industry and the state on behalf of technological innovation — is based on a series of assumptions. Scientific knowledge is believed to have an infinite potential as a major source of technological innovation; technological change is considered essential to social welfare; the material development of mankind is limitless; and that government is responsible for ensuring progress through growth. These assumptions evolved slowly in West European thought, industry and politics over a period of several hundred years beginning with the late Renaissance period and extending through the Industrial revolution.

The Technology - Politics Interface:

Historically the origins of contemporary West European industrialism have their roots in Greek

philosophy and medieval christianity to a certain extent. But a distinguishing feature of this period was the emergence of political entities based on fixed borders, a generally homogenous population and a strong central government exercising unlimited sovereignty. The balance of sovereign powers, their rights, obligations and compromises provided the substance for international jurisprudence and the balance of power theory.[1]

The creation of machinery and the sudden increase of man's authority over his environment caused a significant change in this scenario. The steam engine, the wireless and the energy supplied by coal tightened government control over people and territories and brought governments into greater contact with one another.

The idea of nationalism spread as a result of Reformation and acquired a new dimension when they interacted with the Industrial Revolution. Industrial technology multiplied goods, lowered costs, shrank distances, and changed the employment of millions. The telegraph, railroad and machine gun enabled the technically advanced societies of Western Europe to mobilise their resources, deploy their forces and kill their opponents on an unprecedented scale. This promoted colonialism and mercantilism as an intended consequence. While colonialism or the European control over widespread colonies was a function of European technology, the gradual development of technological centres in Europe

1. Robert Gilpin, "Has Modern Technology changed International Politics?" in James N. Rosenau, et.al,(eds.) The Analysis of International Politics (New York: The Free Press, 1972), pp.166-73.

led to an intensification of rivalry among the European powers. This implied a natural disrespect toward the balance of power concept as the regulator of international relations and its breakdown precipitated the first and the second world wars.

While the end of second world war is cited to mark the beginning of contemporary International system it is interesting to note that the factor of technology retains a continuity. This continuity was manifest in the appearance of nuclear weapons. Politically, this International system is characterised by the emergence of two non-European super powers - the United States and the Soviet Union - whose contest for supremacy set the stage for cold war.[2] While there are different interpretations of the origins and the nature of cold war, the factor of technology acquired dominance and a momentum of its own. This is evident in such developments as the atombomb, hydrogen bomb, the Sputnik launch, the missile race (I.C.B.M'S, S.L.B.M'S, M.I.R.V.'S etc), the anti-ballistic missile system and lately, the Strategic Defense Initiative of the United States.

From the foregoing analysis it becomes clear that

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2. Robert Gilpin, Ibid., p.170 and Sir Bernard Lovell, "The Great Competition in Space", Foreign Affairs (New York), Vol.51, No.1, October 1972, pp.125-6.

modern technology exhibits three characteristics : Discovery, Urgency and Spin-offs.[3] Discovery refers to the infinite increase in scientific knowledge and is the capital or Research and Development. The factor of urgency concerns the demand for innovation and is the motive of R&D. Spin-offs refer to the unexpected effects of innovation and is the hidden dividend of technology. These characteristics are manifest in both the civilian and and military applications of technology. The term scientific and Technological Revolution refers to such developments resulting from technological dynamism and are global in nature.

In a political context the STR elevated technology as a power resource. Attempts by industrialised nations to foster technological innovation can thus be seen as political attempts to alter the flow of technological and economic power that has increasingly conditioned the working of international system.[4] With this end in sight, varied economic and political mechanisms have been increasingly used by national governments to enhance the technological

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3. William R. Kintner & Harvey Sicherman, Technology and International Politics : The crisis of wishing (Massachusetts : Lexington Books, 1975) p.39.

4. Jill Hills, "Foreign Policy and Technology," Political Studies (Butterworth, U.K), Vol.31, No.2, June '83, pp.205-33.

capacity of domestic companies and the export of such technology. Such mechanisms range from the company specific including subsidies, loans, incentives to R&D, to the more general as changing the educational system to increase the number of technologically qualified personnel available to the industry; and to the diplomatic, involving visits by heads of state to back up export promotions, technological agreements, etc. Hence technology has become a counter in international bargaining between nations.[5] As Henry Kissinger opined, "The rate of technological change has continually outstripped the pace of negotiations in arms control talks".[6] Most of the arms control agreements such as the Partial Test Ban Treaty of 1963, SALT-I of 1972 and the INF Treaty of 1987 can thus be seen as political responses to the challenges posed by the military technology. Such is the inter-relationship between the technology and politics.

The international system is a system of state actors with certain characteristics ie., capabilities and intentions acting within a given setting. A comprehensive survey of space policy is concerned with possible changes in the

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5. ibid., p.207.

6. Quoted in William R. Kintner & Harvey Sicherman, Technology and International Politics - The Crisis of Wishing (Massachussetts : Lexington Books, 1975), p.66.

actor's intentions and capabilities that will be brought about by the evolving activities in outer space. The pertinent questions that arise in this context are : How will outer space activities affect the external situation of an actor seeking to promote its welfare? Secondly, how will the actor manipulate space developments to improve its position within this environment? and thirdly, how does it concert the space policy with other elements of it's foreign, defence and domestic policies?[7]

Thus space policy is an analytic examination of some of the major points of intersection between outer space activities and international relations. In a larger context it seeks the vantage points from which to assess selected problems. This, because eventhough nations try to guide events or manipulate the unexpected to their own advantage they differ widely in terms of objectives, skills, information, political doctrine as well as in physical resources.

The launching of Sputnik satellite by the Soviet Union on 4 October 1957 as part of the International Geophysical Year marked the inauguration of the space age.[8] From the standpoint of political observer space became an

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7. Klaus Knorr, "The International Implications of outer-space activities", in Goldsen, ed., Outer Space In World Politics (New York: Frederick. A. Praeger, 1963), pp.114-137.

8. Arnold L. Horelick, "The Soviet Union and the Political uses of outer space", in Goldsen, ibid., pp.43-4.

area contaminated by power politics not so much as an immediate tangible object for occupation or exploitation but as a medium into which activities of terrestrial importance extend - as a source of raw materials or increasing the military might.

The potential of space research for military applications and the external milieu within which the space technology emerged made it a particularly sensitive tool at the disposal of nation. Specifically space politics found a distinct expression in the cold war phase.[9] Active efforts of both the superpowers to stock-pile Inter-Continental Ballistic Missiles (ICBM's) led to what are commonly known as the 'Delivery Systems Race' and the 'Missile Gap Debate' of the 1960's. These were further complemented in space by low-orbit early warning reconnaissance satellites, navigation communications and bomb satellites (K•K.V's). Two major long term developments indicate a shift in the strategic thinking of both the United States and the Soviet Union. First is the growing criticism of the 'Doctrine of Deterrence'.[10] A second indicator is the extraordinary efforts by the two superpowers for increasing their capabilities to use outer space especially for military purposes. An implicit factor for such shift

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9. Lovell, n.2, p.129.

10. Susan Khin Zaw, "Morality and Survival in the Nuclear Age", in Nigel Blake & Kay Pole eds., Objections to Nuclear Defence : Philosophers on Deterrence (London: Routledge & Kegan Paul, 1984), pp.115-43.

in strategic thinking is the possession of a new instrument of political power which could guarantee their security, supremacy and exceptional political position vis-a-vis other countries.[11] Reagan's threat to render the nuclear weapons impotent with the Strategic Defense Initiative is a case in point.

An important fallout of space research is in the economic sphere with its potential for creating a multi-billion dollar world market. Space activities draw not only on rocket capabilities but on the resources of a multiplicity of scientific, technical and engineering fields as well. The satellites are useful in improved weather forecasting, mapping, navigation, communications, reconnaissance, etc. The market for satellite communications equipment, remote sensing satellites, processed remotely sensed data, services like space-related finance and insurance significantly brightens up the area of future space activities. The new requirements continuously generated by space research lead to new advances in all these fields. The proliferation of commercial activities under the auspices of the French Spot-Image, the Great Wall Industrial Corporation (GWIC) of China, NASA and INTELSAT of the United States, Glavkosmos of the Soviet Union and the Arianespace of European Space Agency is indicative of this

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11. Paul Kecskemeti, "Outer Space and World Peace", in Goldsen, n.7, pp.25-42.

potential.[12] Thus, outer space is widely regarded as the proving ground for the advanced scientific and technological capabilities of the industrialised states.

The fact that the export of technologies, products, and services related to space research are based on mutual yet opposite economic interests of exporting countries creates a particularly competitive situation in the international market. This is further accentuated by the fact that the space technologies and products can be used not only for civil purposes but also for military ends - the so-called "dual-use dilemma". This category includes ballistic missile systems, space launch vehicles, supercomputers and systems like individual rocket stages, re-entry vehicles solid or liquid fuelled rocket engines, guidance sets and thrust vector control equipment.[13] Essentially the dual use dilemma involves a blend of space technology with the politico-strategic issue of national security. Here again the political decision-makers determine the particular field in which a specific space technology can be put to.

In the present age, scientific and technological achievements of nations are valued highly. Thus international prestige[14] value is a dominant objective motivating

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12. Stephen F. Von Welck, "The Export of Space Technology: Prospects and dangers", Space Policy (Butterworth), Vol.3, No.3, August 1987, p.223.

13. ibid., p.227. Also see Klaus Knorr, n.7, pp.121-30.

14. Klaus Knorr, n.7, p.131.

nations to participate and excel in space research. As president Kennedy's remarks on Apollo program confirm, "No single space project in this period will be more exciting, or more impressive to mankind..... in a very real sense it will not be one man going to the moon..... it will be an entire nation".[15] Such achievements are seen as a sign of national vigour and excellence, and accords the nation a higher status in the world community. Furthermore, as civilian space capabilities lend themselves to military purposes it serves as a symbol of military power - translating space technology into effective political power.[16]

A national capability in certain civilian and military technologies is essential to the preservation of political independence in the existing international system. A clear win in an important technological competition would pay good dividends. On the contrary, a failure to develop independently its own technological capability in an important field would signify a loss of independence in that area and could substantially erode the nation's political position

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15. Quoted in Kintner, n.6, p.127. Kennedy initiated the Apollo Concept in 1961 with his "new ocean" speech. Sir Bernard Lovell, n.2.

16. As an analytical input in foreign policy making, space success may stiffen the negotiating attitudes of governments - a fact testified by the U.S' arms control postures in the light of it's SDI program.

Space Politics In the Global Context:

In a global context the sweep-stakes of space exploration had been confined to the two super powers in the first decade of the space age ie 1950's with a cumulative technological lead ever since, they comprise the first league in the hierarchy of space-faring nations.[17] However, the lack of agreement between the two main actors led to the formulation of amorphous treaties without meaningful restraints on the space race. As Richard Falk notes, "restraint, if it is to exist at all must be self generated ..... that the parties to be restrained must come to an agreement, ie, that in this case the space powers must enter into a compact of mutual restraint that satisfies their joint and separate interests".[18] Thus the period following the partial Test Ban Treaty witnessed the emergence and assertion of second league of space powers. The West European nations,[19] Canada and Japan formed the second

17. Stephen F. Von Welck, "Dominance in Space - a new means of exercising global power?" Space Policy, Vol.4, No.4, pp.319-27.

18. Quoted in S. Bhatt, Studies in Aerospace Law (New Delhi : Sterling Publishers, 1974), p.130.

19. The West European countries coordinated their national space programs under the European launches Development Organisation(ELDO) and the European Space Research Organisation (ESRO) established in April and June 1962 respectively.

league. embarking on independent space programmes of their own. As the horizons of space politics gradually changed with entry of multiple actors the outer space Treaty was signed in 1967. In the wake of this treaty it was widely believed that outerspace would be a "zone of peace". But, as Jasani points out, "this illusion has been shattered by the past decade of revolutionary advances in military space technology and by the realisation that this treaty only prohibits the placing in orbit around the Earth of any objects carrying nuclear weapons of mass destruction" leaving the field open for reconnaissance and early warning satellites.[20] In a wider context, the outer space treaty preceded the emergence of the third league. Thus a new international space system emerged, characterised by many space actors and the space issues came to be evaluated in terms of the entire system, not confined to the space powers alone.

In the present age the proliferation of international space community with expanding capabilities afford them opportunities for cooperation in space projects that otherwise might be prohibitively costly on an individual basis. Yet, at another level concern about the proliferation of missiles and missile technology led the space powers to

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20. Bhupendra Jasani, Outer Space - Battlefield of the Future? (London: Taylor & Francis, 1978), p.2.

restrict the export of space technology that could be used to produce nuclear capable missiles in the developing countries.[21] Inherent in such policies of technology transfers is a subjective perception of national interests and attempts to perpetuate an unequal and discriminatory space system. This particular factor led to the emergence of a third hierarchy consisting of developing countries like — Brazil, China, India, Israel, Mexico, Pakistan and South Korea[22] — asserting their independence in the arena of space technology.

UN and the Space Law

A major alternative to an unrestrained competitive race in outerspace lies in its internationalisation or supranationalisation under the United Nations. An effective degree of international regulation including the inspec-

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21. A specific reference in this context is the "Guidelines for the Sensitive Missile - Relevant Transfers" signed by the Western supplier countries (US, UK, France, Canada, West Germany, Italy and Japan). For details, see Stephen F. Von Welck, n.12.

22. Peter Marsh, The Space Business (Harmondsworth: Penguin Books, 1985), p.3.

tion to preclude military uses would permit national activities but subject these to strict international controls. It would permit competition for national prestige but dampen the motivation for the competitive race.[23] Supranationalisation would involve assigning all the outerspace activities to a specialised agency of the UN, thus doing away with national rivalry and enhancing the position of the world body.[24]

Traditionally, space law has addressed the regulation of national activity in space through the application of international law.[25] The role of space law is primarily related to its ordering capacity of the international system, a system oriented basically towards the terrestrial community.

The absence of a centralised enforcement authority is a critical fact of international system, and it logically extends to the space law. Commenting on this state of affairs, Richard Falk notes, "..... Restraint, if it's to exist at all, must be self generated ... that the parties to be restrained must come to an agreement ie., that in this case the space powers must enter into a compact of mutual restraint that satisfies their joint and separate

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23. Klaus Knorr, n.7, p.118.

24. Ibid. pp. 114-15.

25. Scott F. March, "Law aboard the Space Station", Space Policy, Vol4, No.4, November 1988, p.328.

interests".[26]

The main aim of evaluation of policies is to outline a framework of inquiry for the study of law and public order of space in their larger context. This helps in the development of a legal order, closing the gaps between the present and future desired goals. A further aim is to suggest clarifications and the common interests of all people in the prescription and application of general community policies with respect of some of the more important new problems.

Law in outer space augmated primarily through the customary prescriptions formed by the voluntary behaviour of states and through the practice of UN resolutions on outer space. The merit of these can be assessed more objectively now, in the sense that they were a means to a legal order in space. The space legal policy has inscribed in the international system, through the custom and treaty, the general principles of freedom, peace, law and copperation.[27]

Issues:

A fundamental issue at the root of legal wrangles in outer space is the claims of national sovereignty over

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26. Quoted in, S. Bhatt, n.18, p.130.

27. Ibid., p.126.

the outer space where exactly is that point which separates airspace - an area where sovereign states would have complete, absolute, and unilateral rights; and outerspace - an area where a certain degree of freedom should exist for all states? And more importantly the point which separates the realm of national sovereignties from ∠ domain of international space law? ∠the

The famous international jurist Jenks takes the position that national sovereignty concept cannot be applied beyond the earth's atmosphere because the realities of interstellar spaces makes such a concept "a meaningless and dangerous abstraction". Jenks proposes that outerspace be a res extra commercium, which will be incapable of appropriation by any particular state. He further proposes that

a) The UN should have jurisdiction over space activities

b) Failing this common international rules and standards should be adopted which would cover a wide range of problems likely to arise.

c) Rules must be adopted governing the extent to which, and the manner in which nations may protect themselves against interference from outerspace with matters lying within their

territorial jurisdiction.[28]

A practical method for formulating the jurisdiction of airspace was suggested by Theodore Von Kerman. According to him the basis for dimarcation of atmospheric and space jurisdiction are the conditions necessary for accomplishing aerial flight, expressed by the equation, weight = Aerodynamic lift + Centrifugal force. The aerodynamic lift decreases with the altitude because of the decreasing density of air and in order to maintain continuous flight after the airlift has been reduced to zero, centrifugal force or keplar force must take over , at 126000 ft.

The velocity is limited by the altitude so that maximum speed at sea level would be 5000 ft/sec. Beyond this point friction with atmosphere produces skin temperature of more than 2000°F. Similarly altitude is limited by velocity. At a spped of 5000 ft/sec the maximum altitude attainable is approximately 150000 ft. However this velocity is insufficient to attain greater altitude.

Therefore there are two borderlines for continous flight which terminates when at an approximate speed of

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28. Andrew G. Haley, Space Law and Government (New York: Appleton-Century-Crofts, 1963), p.86.

25000 ft/sec and an altitude of about 275000 ft. the Keplar force takes over and the aerodynamic lift is gone. This is a critical jurisdictional line marking the theoretical limit of air flight - termed von Kerman primary jurisdictional line.[29]

UN's role:

The UN's initial attempts to codify space law was the Resolution 1721 (XVI) of Dec 20, 1961. It provided that: By International law including the Charter of UN applies to outer space and celestidal bodies, and by outer space and celestial bodies are free for exploitation and use by all states in conformity with international law and are not subject to national appropriation.

At the United Nations, the establishment of "Ad Hoc Committee on the peaceful uses of Outer Space" in 1959 marked a concrete step toward the development of international space law. All the main international agreements regulating the various aspects of outer space exploration and use have been negotiated and drafted

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29. ibid., p.98.

within the framework of COPUOS. Five multilateral treaties comprise the foundation of present day International space law.

Outer Space Treaty, 1967:

The most important among these agreements is the "Treaty on Principles governing the Activities of States in the Exploration and use of Outer Space, including the Moon and other celestial Bodies", (the "outer space treaty"), signed on 27 January 1967 and entering into force on 10 October 1967. It embodies a recognition of the twin principles of freedom and non-appropriation in relation to outer space.

The key principles of the Treaty are found in articles I & II. Article I declares that outerspace, including the moon and other celestial bodies is the 'province of all mankind' and 'shall be free for exploration and use by all states without discrimination of any kind, on a basis of equality and in accordance with International law.

Article II establishes the non-appropriation of any part of outerspace or of any celestial body, by means of use or occupation, or by any other means.

Article III calls upon all states to adhere to the principles of international law and the U.N. Charter in the exploration and use of outerspace. With the broad aims of maintaining international peace and security, and promoting international cooperation understanding.

Article IV established the first principles of arms control. It prohibits the nuclear weapons and other weapons of mass destruction from being placed in Earth's orbit or on any celestial body.

Article V recognizes astronauts as 'envoys of mankind in outerspace' and calls upon all states to render them all possible assistance in the event of accident, distress or emergency landing on the territory of another state party or on high seas.

Article VI makes the states internationally responsible for national activities in outer space, including those performed by non-governmental organisations. Further, when outerspace activities are carried on by an international organisation, "responsibility for compliance with the treaty shall be borne both by the international organisation and the states.... participating in such organisation."

Article VII establishes the principle of international liability of a state for damage to older state or to its natural or juridical persons by such object or its componant parts on Earth, air or outerspace including the Moon and other celestial bodies.

Article VIII establishes the jurisdiction, ownership and control over objects (and personnel) launched into outerspace, by the launching state.

Article IX calls upon all states to follow the principle of cooperation and mutual assistance and to avoid harmful contamination of Earth's environment, and harmful interference with activities of other states. Further it provides for convening a consultation whenever activities of a state in outerspace tend to interfere the principle of peaceful exploration and use of outerspace.

Article X calls upon states to afford on a basis of equality, an opportunity to other states to observe the flight of space objects launched by those states the nature and conditions of such opportunity shall be determined by agreement between the states concerned.

Article XI makes it obligatory upon States conducting activities in Outerspace to inform the Secretary General

of UN, of the nature, conduct, location and results of such activities.

Article XII provides that all stations, installations, equipment and space vehicles shall be open to representatives of other states on a basis of reciprocity and on advance notice of such visit.

According to Article XIII the provisions of this treaty shall apply to the activities of states party to the treaty, whether they're conducted by a single state, jointly with other states, or within the framework of an inter-governmental organisation.

Further any practical questions arising from the activities of an international inter-governmental organisations in the exploration an use of outer space shall be resolved by the states either with the appropriate international organisation or with one or more state members of that international organisations.

The "Agreement on the Rescue of Astronauts, the Return of Astronauts andthe Return of objects launched into outer space" of 22 April 1968 requires the nations to render all possible assistance to spacefarers who

inadvertently land beyond their national borders.

The "Convention of International liability for Damage caused by space objects", of 29 March 1972 (The "Liability Convention") elaborated the question of liability generally covered in Article VII of outer space treaty. The principal purpose of the liability convention is to "ensure... the prompt payment" of a full and equatable measure of compensation for loss of life personal injury, loss or damage caused by space objects (preamble of Article I).

Specifically Article XXII of the Convention extends the application of the Convention to International inter-governmental organisations provided it accepts the rights and obligations of the Convention.

The authorised remedies under the liability convention do not preclude an action being brought in the courts, administrative tribunals or agencies of the launching nation. Thus it provides an opportunity for national law to resolve space related disputes.[30]

The "convention on registration of objects launched into Outer space" (The "Registration Convention") of

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30. Scott F. Marsh, n.24, p.329.

1975, formalises the procedure for registering space objects launched into outer space and is of relevance to issues of space law jurisdiction. Compliance formally establishes which nation shall retain jurisdiction and control of space objects.

The major purpose of the convention is the establishment of a mandatory system of international registration of objects launched into outer space, to assist in the identification of such objects and thus facilitate the implementation of space law agreements, especially the liability convention and the 'Rescue and Return of Astronauts and objects' Treaty. The Secretary-General of UN is charged with the maintenance of a register containing information about the date and place of launch, orbital characteristics, etc.

The latest addition to the developing corpus of international space law is the "Agreement Governing the Activities of states on the Moon and Other Celestial Bodies" (The Moon Agreement) of 14 December 1979. It aims at ensuring that all activities on the moon and other celestial bodies are carried out for peaceful purposes in accordance with international law including the UN Charter, in the spirit of cooperation and in an

environmentally sound manner. It declares moon and its natural resources as the 'common heritage of mankind".

Elaborating upon Article IV of the outer space treaty this agreement provides for the effective demilitarisation of moon and other celestial bodies. It bans the use of moon in order to commit hostile acts or to threaten any such acts in relation to the Earth, the moon, the spacecraft, the personnel of spacecraft or man made space objects (Article 3.2.)

Further it explicitly prohibits the placing of nuclear weapons and other weapons of mass destruction on the moon, orbits around, and trajectories to it. (Article 3.3)[31]

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31. For details, please see text of the Agreements in "Space activities of the UN and international organisations: A review of the activities and resources of the UN, of its specialised agencies and of other competent international bodies relating to the peaceful uses of outer space," A report of the UN Committee on the Peaceful Uses of Outer Space, (A/AC.105/358) 1986.

CHAPTER - 2

ORIGINS OF EUROPEAN SPACE POLICY

CHAPTER - 2

ORIGINS OF EUROPEAN SPACE POLICY

In mapping the contours of European Space Policy it is pertinent to touch upon the post-war developments obtaining in the European context. This helps us to highlights:

1) The political patterns associated with the origins of European space cooperation i.e. programme definition phase -- How did the outer space activities affect the external situation of the Europe's national actors seeking to promote their welfare?

2) The political patterns associated with the evolution of European space cooperation i.e., R&D, prototype and commercial phase -- How did these actors manipulate space developments to improve their positions within this environment?

3) These patterns are in turn determined by the relationship between the goals (external and internal) and capabilities (technological, industrial and politico-strategic) of individual European actors -- How did they concert the space policy

with other elements of their defence, domestic and foreign policies?

Marshall plan and its fallout:

In the postwar Europe, the reconstruction programme was undertaken by the U.S. first through the lend-lease, and afterwards in 1948 through the European recovery program or the Marshall plan. On a political plane, the U.S. sought to shield its West European friends from the vicissitudes of an intense cold war by the Truman doctrine.[1] Thus, under the sheltered political atmosphere the Marshall plan sparked a general recovery in Europe by 1952 and the upturn in production levels surpassed those of prewar level in the participating countries.

However the continuation of such programme ran into roadblocks by 1952, as a result of domestic pre-

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1. The Truman Doctrine (12 March, 1947) intended to help free people to maintain their national integrity was aimed at containing the Soviet Union's expanding spheres of influences. Max Silberschmidt, The United States and Europe: Rivals and Partners (London: Thames & Hudson, 1972), pp.147-64.

sures in U.S. and the renewed confidence of European countries.[2] An obvious fallout of the massive US investment was the penetration of key growth industries in Europe such as aerospace, computers, electronics, etc. It raised doubts as to whether Europe can learn to use and benefit from US investment without becoming subordinate and whether Europe can keep pace with US in new technologies.[3] and economic growth.

In the short run though the US investments in such key industries spared the Europeans research costs, in the long run the economies were perceived to be deprived of the ability to pursue rapid economic expansion that exists only in these industries.[4] Thus while the Marshall plan was intended to put a devastated Europe back on its feet the intermediary effect of the US' penetration of key growth industries

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2. Joyce and Gabriel Kolko, The Limits of Power: The World and US Foreign Policy 1945-54. (New York: Harper & Row, 1972), pp.460-78.

3. Randolph Burgess and James R. Huntley, Europe and America - The next ten years (New York: Walker & Co., 1970), pp.43-63.

4. Servan Schreiber, The American Challenge. (London: Hamish Hamilton, 1968), pp.41-46.

ingrained in Europeans a keen desire to catch up with the Americans in the field of emerging technologies.[5]

Technological Leads:

In the industrial sectors associated with modern technologies like aerospace, computers, electronics, etc. the US' firms have often become multinational as a result of their effort to protect and enlarge a foreign market acquired on the basis of unusually strong technological leads developed during the war years and immediately thereafter. A similar trend existed in the industrial use of outerspace, weather control, computers and other politically sensitive industries. This became pronounced partly due to the problems of scale faced by European firms — a fact overcome by US firms due to the size of US market and the scope of government programs in high-technology fields such as atomic energy, aerospace, etc.[6] The Europeans saw the U.S. increasingly as the place where decisions are made and Europe as the place where they are later put into application. This raised

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5. As Servan Schreiber remarked, "The knowhow, that opens the gate to the post-industrial society can exist only in an independent community, for the community where the strategic industrial decisions are made in the community that will break through barriers, occupy forward positions and hold the reins of power, "Servan Schreiber, ibid., p.46.

6. David S. Landes, ed., Western Europe: The trials of partnership-critical choices for Amiericans

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fears of being overtaken by a more advanced civilization of U.S. with its monopoly over technological innovation.[7]

Among the ramifications of burgeoning technology were transatlantic phenomena known as gaps -- the research, or technological gap; management gap; educational gap -- referring to the divergent capabilities of the Atlantic partners.[8] The technology gap was manifest in the transatlantic trade and capital flows, patent statistics and innovation patterns. The Europeans were particularly concerned with the technological gap as it had wide reperocussions on its industrial and economic competence.[9] Increasingly they perceived the reduction in profitability of exclusively European corporations by way of high royalties for US patents and licenses as a neo-colonial drain of funds exceeding the US capital investments.[10] The rise and fall of concern over technology gap re-emphasised some fundamental points about international technological relations. The capacity for innovation

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(Massachusetts: Lexington Books, 1977), pp.357-60.

7. Servan Schreiber, n.4, pp.41-3.

8. Burgess and Huntley, n.3,

9. Brain drain, a symptom of US' technological predominance seriously affected Europe's scientific pool and was part of the technology gap controversy in Euratlantic relations. See, Christopher Layton, European Advanced Technology, A Programme for Integration (London: George Allen & Unwin, 1969) pp.16-20.

10. Servan Schreiber, n.4, p.41.

was not confined to any single nation, Europe and Japan had strong innovative capabilities as well.[11]

The Euratlantic Competition:

From a political point of view the most sensitive part of the problem of technological gap is the sheer scale which is a critical pre-requisite for success -- the scale in organisation, scale in financing, scale in markets, etc. US firms could cope with such problems of scale better than European firms due both to the size of US. market and the scope of government programs in high technology fields. The repeated efforts by European governments since 1950's to redress the balance in technology based industries entailed cooperative agreements among several nations. The European movement by 1957 had reached a point at which Europe had acquired some sort of political personality and could contemplate a set of initiatives in various high technology fields - and in which the individual states gave up their decision-making powers to some European entity. Thus, a convergence of political interests seemed necessary to expedite the resolution of open-ended technical

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11. David S. Landes, n.6, p.357.

discussions and establish the framework of common or complementary goals of cooperation. These projects in common represented a riposte against US' technological leadership and operated on the principle of 'le juste retour' — each nation's suppliers being entitled to sell an amount of goods and services exactly equal to the nation's contribution to the project.[12] This pattern of Euratlantic relations explains both the cooperative efforts to resolve the problems of scale, and a broad basis for arriving at decisions in the European space initiatives taken in 1962.

Issue areas in European Politics:

In analysing Euratlantic disputes, Theodore Geiger viewed 'new nationalism — stressing Europe's economic recovery and advanced state of economic integration — as the principal force bringing political disputes to the surface in US-European relations.[13] Commenting on the possible change in attitude brought about by such union, Herman Kahn noted, "From a strictly European

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12. ibid., p.358.

13. Henry R. Nau, National Politics and International Technology (Baltimore: Johns Hopkins University Press, 1974), p.46.

point of view the existence of such a community would remove from the Europeans any excuses that they lag behind because of inadequate size of enterprises, markets and, or, government subsidies".[14] It is against this backdrop that the birth of European regional initiatives in various fields like resource management, economy and technology become comprehensible. This was in tune with the inherent belief of Atlanticist philosophy in economic and military strength deriving from superior technological dynamism. While the ECSC, EURATOM, CERN and EEC were regional responses to the specific needs of that period, with the advent of space age in 1957 the space research emerged as an 'issue area'[15] in international technological relations. It raised similar demand for a regional approach to harness the space — in the fields of telecommunications television, meteorology and navigation. As Servan Schreiber remarked, "we have to recognize that aside from certain scientific experiments no single European nation can carry on a major space programme. Joint action is essential.... Unless the nations of Europe succumb to bilateralism and try to work out separate

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14. Quoted in, Servan Schreiber, n.4, p.157.

15. James N. Rosenau, The Scientific Study of Foreign Policy (New York: The Free Press, 1971), pp.13-19.

deals with the U.S. thereby losing much of their identity — they will have to join together for space research."[16] Some academicians like Schaerf argued that by raising the technological issue, Western Europe sought greater participation in the Atlantic system.

There were specific groups and interests that have advocated cooperation in area of space technology. The first group that emerged in favour of a cooperative approach in space research was a group of scientists. Realising the potential of space technology for greater initiative in international technological relations, they proposed a plan for 'Cooperative European Space Research' at the first 'International Space Science Symposium' sponsored by the UN's Committee for Space Research (COSPAR) at Nice, Italy on 14 January 1960. This plan, drafted by the Italian scientist Dr. Amaldi and supported by a group of European scientists introduced a political and economic note in the deliberations of COSPAR.[17]

Further, three hundred European firms belonging

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16. Servan Schreiber, n.4, p.92.

17. New York Times, 15 January 1960. Also see, Harrie Massey & Robins-M.O., History of British Space Science (Cambridge: Cambridge University Press, 1986), pp.109-110.

to EUROSPACE formed another group to push the European governments into space race. They saw great potential for industries through space research in communications, meteorology, navigation and further spin-offs such as breakthroughs in refractory metals, computers and equipment for working in microgravity.[18]

Dynamics of Atlantic Alliance:

Besides a purely economic and technological motivations impelling moves toward an independent European space initiatives a third angle to this issue lay within the nature and working of NATO. Even within the NATO, which provided for a geographical diffusion of military-technological paradigm, strains erupted in the fields of arms production, transfer of technology and the relatively intractable debate of defence standardisation — highlighting the NATO's technological crisis.[19] At the root of the strains in such strategic consensus was the technology gap which filtered down to industrial and technological levels provoking a reassessment of national policies in these areas.[20]

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18. Servan Schreiber, n.4, p.91.

19. Mary Kaldor and Richard Falk, Dealignment: A New Foreign Policy Perspective. (New York: Basil Blackwell Inc., 1987), pp.152-53.

20. Henry R. Nau, n.13, p.44-46.

The three outstanding issues in NATO's dynamics were:

a) burden-sharing - proper level of defence spending,

b) standardisation of weapons and

c) Europe's quest for an equal role in the decision-making apparatus - the finger over the trigger' controversy.

Burden-sharing:

The first decade of NATO during the Truman administration was marked by the assumption of greater responsibilities by the U.S. concerning military expenditure. At this juncture NATO resembled a one sided alliance where one party receives most of the burden and the other party carries most of the burden often resulting from complementarity of national interests.

But by the late 1950's as the European miracle became apparent, increasing sections of American public opinion and congress started doubting the rationale behind continued military aid to European countries starting the burden sharing debate. Under the Eishenhower administration the William Dawson report to the 85th congress raised veiled questions while the Mike Mansfield report to President Kennedy was more forthright in highlighting the inequitable burdens

on U.S. and insisting on a greater European contribution.[21] Included in this debate is the U.S.' insistence on a 3% annual real increase defence spending and the varying interpretations in assessing such contributions.[22]

Standardisation:

It refers to the common compatible or interchangeable supplies, components weapons or equipment and common or compatible doctrine with corresponding organizational compatibility.[23] The rationale behind the multinational standardisation programme was the benefits due to economies of scale resulting from long production runs coupled with cost sharing at research stage.[24]

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21. Christopher S. Raj, American Military in Europe: Controversy over NATO Burden Sharing (New Delhi: ABC Publishing House, 1983), pp.241-73.

22. While the defence expenditure calculated in proportion to per capita GDP is preferred by Europeans, the US insists on a real growth in defence spending and on the defence expenditure per capita. For details of these viewpoints, see, Christopher Coker, The Future of Atlantic Alliance (London: Macmillan, 1984), pp.76-94.

23. Linda P. Brady & Joyce P. Kaufman, NATO in the 1980's: Challenges and Responses (New York: Praeger Publishers, 1985), pp.139-43.

24. Christopher Coker, n.22, p.84.

In the first decade of NATO, its forces had been largely equipped with US built system — first through lend-lease of US equipment till 50's and later through generous sales and credit terms by U.S. However with the revival of European industries, European governments have increasingly purchased major weapons systems such as tanks, aircraft, etc. from domestic industry rather than the U.S. Thus Alliance forces have become increasingly destandardised and less and less interoperable. The deterrent to European Cooperation with US in defence production had been the US reluctance to transfer the technology needed for producing high-technology defence equipment meeting high U.S. specifications.[25]

In the area of technology transfers the COCOM regulates the export of high technology as part of the wider containment policy of US toward the Eastern Bloc nations. Nevertheless, in its operation it also tends to inhibit exchange among western alliance members. Thus a tightening of US export controls vis-a-vis COCOM member states was justified in terms of supposedly insufficient procedures for industrial security

25. See, Linda P. Brady and Joyce P. Kaufman, n. 23.

and inadequate export controls in these countries — raising fears among Europeans that the US might turn it into a vehicle to protect its technological lead.[26] In the face of the relative exclusivenss of U.S.' space policy in terms of technology transfer the alliance proved to be an ineffective in satisfying the demands of European members for independent space capability. This led to consequent regional efforts on part of the Europeans in the field of space research.

Decision Making:

The technology gap was the basis of another dispute within the NATO concerning the control of nuclear weapons policy. The space race initiated by the Soviet Union gave birth to I.C.B.M.'s posing a direct threat to the U.S. mainland. This development led to doubts in Europeans about a possible decoupling of US' security vis-a-vis Western Europe Conscious of their technological inadequacy in providing for their own defence, the Europeans saw the need to secure a more direct and significant role in the decision-making process controlling the alliance's strategic forces. The U.S. proposal on Multilateral Nuclear Forces did not elicit positive response from France because it denied equal and direct role in the alliance's

26. Klaus Ritter, "The Critical Issue of the Transfer of Technology", NATO's Sixteen Nations (Brussels), Vol.30, No.4, 3 July 1985, pp.39-45.

strategic policy and control of nuclear weapons. Eventually the MLF proposal was rejected.[27]

Of specific relevance to the European space policy is Gen. Norstad's Consortium proposal of December 1957. According to it, a European Consortium was proposed which would produce medium range ballistic missiles (MRBM's) with the technical data provided by the U.S. — meeting SHAPE requirements for the NATO force. Further it proposed that the European allies would exercise direct control of the means of delivery so produced although the warheads would remain in US' custody.[28] When this proposal is read together with a consequent fact of the European launcher taking shape from the missile systems of U.K., and France — the Bluestreak and the Veronique — the Europeans quest for space capability stands in a proper perspective.

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27. Henry R. Nau, n.13, pp.44-48.

28. Paul Buteux, The Politics of Nuclear Consultation in NATO 1965-80 (Cambridge: Cambridge University Press, 1983), pp.15-18.

The Formation of European Launcher Development Organisation:

Pursuing the lead provided by a group of European scientists at the COSPAR's Space Science Symposium at Nice in January 1960, the British Minister, Thorneycroft proposed an international space research group for Western Europe in September, 1960.[29] This proposal crystallized with the establishment of an inter-governmental preparatory commission,[30] to organize a space agency modelled after the West European Center for Nuclear Research (CERN).[31] At this stage the European aspirations were quite modest and were directed at a) launcher capability and b) basic space research with satellite construction capabilities. The policy goal was not to launch European Consortia for a space race with the superpowers but just as an initiative for greater independence in this field of high-technology. As Thorneycroft attested, "I don't think it is really necessary for us to compete on the same scale as the U.S. and Russia...If we go into it together all of us can contribute technical resources and it will cost less."[32]

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29. New York Times, 22 September, 1960.

30. Harrie Massey and Robins M.O. n.17, pp.114-19. Also see, New York Times, 2 December, 1960.

31. ibid., p.114.

32. New York Times, 30 October 1960.

A follow-up 12 nation European Conference on space exploration was convened at Strasbourg on 30 January 1961. This conference, chaired by Thorneycroft, the British Minister for supplies, addressed itself to the first issue of a launcher capability. It proposed the setting up of a European space launcher organization with a plan for 3-stage rocket, to be built jointly. The British Blue-streak missile was to comprise the first stage of the rocket, the French Veronique, the second stage, while the third stage was to be developed by West Germany.[33] The European Launcher Development Organisation (ELDO) was formally established on 29 March 1962 at London with the signing of an agreement to this effect by Australia, Belgium, France, West Germany, the Netherlands, and U.K. The remaining members of European community Austria, Denmark, Norway, Sweden and Switzerland ratified it by 30 April 1962.[34] A unique feature of the ELDO was the participation of Australia a non-EC nation. With similar aspirations for space technology capabilities Australia cooperated with the European initiative by offering the launching range at Woomera.

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33. New York Times, 31 January 1961.

34. For the text of ELDO Convention, please see, British and Foreign State Papers, 1961-62, Vol.166, (London: Her Majesty's Stationery Office, 1968), pp.679-711.

Organization of ELDO:

The ELDO was governed by a Council constituted of two representatives from each of the member states meeting at least twice annually. In the Council, unanimity was required for admission of new members, the adoption of regulations on the placing of new contracts, certain external questions like providing information to non-members and delivery of launchers to them. The operations of ELDO were headed by a Secretary-General at its headquarters in Paris. He coordinated the operations of the organization, a Technical Director, an Administrative Director and the auxiliary staff. The ELDO operated essentially as a loose federation of national activities. A characteristic feature of ELDO was that it was largely run by government representatives concerned with development and production.

Among ELDO's programmes, the three stage launcher proposed earlier was the mainstay while Belgium played a key role in developing radio guidance system and ground guidance stations. The Netherlands was responsible for developing a long range of telemetry link and Australia provided the launch site at Woomera for development flights of Blue Streak and the three stage rocket.[35]

35. Harrie Massey and Robins M.O., n.17, pp.124-5.

These arrangements signified the degree of harmonisation between national policies achieved in the regional initiative for space research. Though there were previous instances of regional cooperation in other fields like ECSC, EURATOM, CERN, etc., the ELDO was an immediate precursor to the ESRO.

Establishment of European Space Research Organization (ESRO):

The same preparatory commission that conceived the ELDO for space applications had also proposed European Space Research Organisation to provide resources for pure scientific research for use by independent scientific groups. The proposed scientific programme of ESRO included

a) a sounding rocket programme

b) a light satellite programme for ionospheric research, and

c) a heavy satellite and space probe programme for astronomical observations

Formally the ESRO convention and the financial protocol were signed in Paris on 14 June 1962 at an inter-governmental meeting.[36]

36. New York Times, 15 June 1962.

Structure:

The ESRO convention provided for the operation of the organisation by a council and a Director General. Each member state nominated two delegates to the Council which met twice a year. A Chairman of the Council and two vice-chairmen were elected annually and could be re-elected on not more than two occasions.

The organisation was based on three directorates reporting to the Director General. These were headed by a Technical Director, a Scientific Director and a Director of Administration.

The ESRO's activities included sounding rocket programmes with Skylark and centaure series provided by U.K. and France respectively. Further small stabilised satellites (ESRO II, TD- 1 & 2) and a deep space probes HEOS 1 and HEOS - 2 were launched with American launchers for astronomical research.[37]

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37. Space Activities of the United Nations and International Organisations: A review of the activities and resources of the United Nations, of its specialised agencies and of other competent international bodies relating to the peaceful uses of outer space, "A/AC.105/358" (New York: United Nations Publications, 1986), p. 119.

Amalgamation of ECDO and ESRO:

Though the initial programmes of ELDO were undertaken keenly, the very nature of its organisation proved to be a limiting factor, due to the following reasons:

a) Being a loose federation of national activities with government representatives overseeing the respective programs it led to a promotion of national programmes.

b) There was a marked reluctance on part of potential users of satellites to become financially involved in the development of launching rockets which in their terms would be a very expensive operation. Particularly while U.K. favoured the use of NASA's launcher facilities preferring economy, France was more insistent on an independent European space infrastructure, and launching capability as being essential for freedom of action in space.

c) There were obvious shortcomings in the execution of projects. The absence of a nominated prime contractor for over-all launching system resulted in a tenuous management chain of a complex project,

d) Prolonged delays and escalation of costs led to a crisis in 1966 with UK reducing its contribution from 38% to 27%. It further decided in 1968 not

to support the development and launching of satellite launching rockets. Finally, a truncated ELDO, without UK continued until 1973 when it was abandoned and subsumed under the ESA.

The problems in the functioning of ESRO were similar to those of ELDO. Broadly they were as follows:

a) By 1966 though the ESRO's scientific programmes were progressing smoothly (ESRO I II, HEOS-A, TD - 1 & 2) the project works were escalating and capital works slipping behind schedule with consequent underspending. Governments refused to sanction the carry over of unspent funds from one financial year to the next, and the ESRO council was unable to agree on future level of resources.

b) The problem of ESRO budget and programme were aggravated by British withdrawal from ELDO and the tendency among the countries to recoup the extra costs which fell on other ELDO members by reducing financial allocations to ESRO.

c) There was disagreement over future funding and programme of ESRO. Belgium, France and West Germany favoured a balanced over all space programme for Europe including satellites for scientific research and applications and launching systems. On the other hand, U.K. favoured

scientific space research and application satellite programme opting for economical launching facilities offered by the U.S.

d) There were increasing pressures for an improved coordination or the merger of two parallel European space organizations into a single body executing a predetermined space policy.[38]

Proposals for the amalgamation of ELDO & ESRO:

All the above problems in ELDO and the ESRO led to the setting up of Bannier Committee in 1966 which reported in 1968. Modifying the ESRO's set-up of three directorates it proposed a four directorate set-up reporting directly to the Director-General, and integrated the science and technology Directorates. It proposed the location of Directorates of programmes and planning, and of Administration in Paris. Further the Directorate of Space Research and Technology was to be located at Noordwijk and that of space operations at Darmstadt.[39]

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38. Harrie Massey & Robins M.O., : n.17, pp.224-230.

39. ibid., pp.161-2.

Concerning the programmes, the second EUROSPACE Conference in July 1967 appointed an Advisory Committee under J.P. Causse. Reporting in 1968 it called for the fusion of ELDO and ESRO, and establishing a single European Space Agency. It envisaged a single European space programme to include elements of scientific research, apllications of space technology and the development of satellite launching rockets. To enable some countries to opt out of expensive launcher development programme it proposed that all member states should contribute to a minimum basic programme with an option to contribute to the launcher programme.[40]

The last of the proposals suggesting a revision of the European space policy divided between those favouring a balanced overall programme including launcher (Belgium, France & Germany) and U.K. which favoured scientific space research and applications satellite was the "Puppi proposals" of May 1971. It proposed reorientation in predominantly scientific nature of ESRO, with emphasis on space applications programmes in aeronautics, meteorology and telecommunicatons. Though scientific programme and

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40. ibid., p.229.

basic activities were to remain mandatory they were to be reduced in size.[41]

In sum, the crisis in European space policy in late 70's drives home three basic points:

(a) the fact that European Space policy was caught in the cross-currents of American Space programme[42] i.e. NASA's offers of collaboration and divergent European' responses.

(b) the politics of regionalism had its impact on the European space policy. The French vetoes of the British application to EEC membership and the British withdrawal from ELDO seemed to be parallel developments.

(c) the agreement to establish a single European Space Agency and hence a single programme had the element of consensus with regard to the external challenge i.e., NASA's post-Apollo offers of Cooperation in Spacelab, Space shuttle and space station programmes.[43]

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41. ibid., pp.232-4.

42. William Kintner and Harvey Sicherman, Technology and International Politics (Massachusetts: Lexington, 1975), p.82.

43. At the fifth meeting of European Space Conference of ministers, Brussels in December 1972 agreement was reached on all outstanding issues. These included future cooperation with NASA in developing Spacelab, the inclusion of ARIANE as European launcher and of MAROTS maritime communication satellite, of special interest to UK and the establishment of ESA. Harrie Massey & Robins,M.O,,n.17,p.236.

CHAPTER - 3

ESA: A STUDY OF ITS STRUCTURAL AND FUNCTIONAL ASPECTS

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Broadly the European space policy can be divided into two phases. The first phase (starting 15 Jan 1960 through 30 May 1975) was marked by the identification of space as an issue area for regional cooperation and inchoate attempts made to formulate a space policy. Nevertheless, there are some reasons for the limited success. Firstly, the operational set-up pursuing the aim of space capability left ample scope for the dual natured behaviour of member states toward ELDO and ESRO.

Secondly, the difficulty lay in formulating an independent European space policy because of the cold war politics and the predominance of US in defining the nature of western security system and threat response.

Thirdly, the regional political dynamics too, was an impedement to an acceptable European space policy. The French veto of the British application for EEC membership was an instance of such strains in the

European regional politics.[1]

The second phase of the European space policy was marked by an altogether different political climate globally. The era of detente starting with the signing of SALT-I in 1972 was consolidated by the implicit agreement on SALT II in 1974 and the conference on security and cooperation in Europe in July 1975. A parallel development, and of specific relevance to European space policy is the space detente[2] marked by the Apollo-Soyuz Test project (ASTP) on 17 July 1975. All these developments highlighted the superpower agreement on a variety of issues and a consequent relaxation of political tension. On a regional plane, the British entry into the European Economic Community on 1 January 1973 was another turning point.[3]

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1. The successive French vetoes of British entry into EEC was the low water mark in the European integration efforts, with its obvious fallout in the space policy - the British withdrawal from ELDO.

2. United States House Committee on Science and Technology. Sub Committee on Space Science and applications, Space activities of U.S., U.S.S.R., and other launching countries: 1957-86; report, October 1987 (100th Congress, 1st session), pp.6-12.

3. This coincided with the fifth meeting of European Space Conference of ministers in December 1972, wherein an agreement was reached

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Against the backdrop of these developments the agreement on outstanding issues of European space policy - at the fifth meeting of the European Space Conference (ESC) of ministers in December 1972 at Brussels - and its transformation into a detailed plan of action at another meeting of ESC in July 1973 acquire greater meaning. These developments offered a renewed focus for the redefinition of European space policy. Indeed the sixth and final meeting of the ESC ministers finalised the draft convention of European Space Agency in April 1975. Merging the ELDO and ESRO, it underlined the fact that the European states share a common vision of Europe's future in space and that there is a political will to take the required decisions.

Specifically the 'Second Package Deal', which formed the basis for the ESA Convention and facilitated a continuity in European Space Policy was a delicately balanced comprised. Its provisions included:

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on all outstanding issues of European Space policy. For details, see, Harrie Massey and Robins, M.O., History of British Space Science (Cambridge: (Cambridge University Press, 1986), pp.232-7. Also see, New York Times, 21 December, 1972.

a) The adoption of Ariane as European launcher representing French interest in independent European launch capabilities;

b) The inclusion of maritime communications satellite (MAROTS), denoting British interest in applications programmes.

c) The Spacelab agreement with NASA denoting German interest in manned spacelight. Further the agreement represented a uniform European response to the NASA offer.

d) An agreement to establish European Space Agency (ESA) in which all the functions of ELDO and ESRO, would be subsumed.[4]

Establishment of European Space Agency (ESA):

The draft convention of ESA was signed on 30 May 1975,[5] at Brussels, by Belgium, Denmark, France, Ireland, Italy, the Netherlands, Spain, Sweden, Switzerland, U.K. and West Germany. Subsequently additional members joined ESA. They include Austria and Norway, with Finland as an associate member and Canada through a cooperative agreement. The ESA

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4. ibid., p.236.

5. New York Times, 31 May 1975.

operates from the headquarters in Paris.

According to the ESA convention all members states should participate in the mandatory activities and should contribute to the fixed minimum costs.(Art.I)[6]

Art.II describes the purpose of the agency as providing for and promoting peaceful cooperation among member states in space research and technology, and their space applications with a view to their use for scientific purposes and space applications. This is achieved by a) implementing a long term European space policy concerting the policies of member states with respect to other national and international organisations. b) coordinating the European space programme and national programmes by integrating the latter progressively and as completely as possible into European Space programme, particularly application satellites.

ESA's activities comprise of mandatory and optional programmes. All members will participate in the latter except those who formally opt out (Art.V)

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6. Harrie Massey and Robins, M.O., n.3, p.237.

Mandatory activities include the basic programmes such as education, documentation studies of future systems and technological research. They also comprise of a scientific programme with the aid of satellites and other space systems; the collection of information and dissemination to members; and advice and assistance in the harmonization of internatonal and national programmes. The provision for mandatory and optional programmes is a distinct improvement over the ELDO and ESRO programmes while the mandatory activities in areas seen as vital to regional space capabilities- imparts an exceptional degree of coherence to ESA, the optional programmes offered considerable latitude to nations with specific interests. This option is further highlighted by Art. VIII which grants preference to the users of launchers and and space transportation systems, to utilise them only if they do not present an 'unreasonable disadvantage' compared with other launchers in terms of cost, reliability and mission suitability.

Concerning the use of Agency facilities by member States, Art.IX, makes them available to users at the cost of the state concerned, provided that the host nations activities and programmes are not there by prejudiced.

The two most important changes over the ESRO framework concerned a) internationalization of programmes and b) preference for the use of ESA or member states' launching systems.[7]

The Long Term Space Plan:

The ESA's long term space plan was adopted through a ESA Council resolution on 10 November 1987. It further complements the ESA Convention by charting out the specific objectives to expand the horizons of space research and exploitation in Europe.[8] It postulates a European space programme as a coherent whole with balanced spending on space research and applications, enabling European scientific community to remain in the vanguard of space research. In the field of applications it sought to develop the potential of space for telecommunications, meteorology and earth observation. The microgravity research programme was aimed at the development of material sciences, life sciences and fluid physics for practical applications in space. The European Space transportation capability was to be strenghtened to meet future user

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7. ibid., pp.237-9.

8. Text of the "ESA Council Resolution on the European Long Term Space Plan", in Space Policy (Butterworth), Vol.4, No.1, February 1988.pp.86-91.

user requirements both inside and outside Europe and remain competitive with the space transportation systems of other countries. It sought to prepare autonomous European facilities for the support of man in space, for the transportation of equipment and crews, and making use of low earth orbits.

The ESA's industrial policy is aimed at meeting the requirements of European Space programmes in a cost effective manner through coordination. It seeks to improve the worldwide competitiveness of European industry by raising the technological level and industrial capacity related to space of all member states. This is sought to be achieved by the close association of industry in the implementation of various programmes through a vast chain of sub-contractors under a prime contractor.[9]

Organization of ESA:

The apex body of the ESA concerned with the formulation of European space policy is the ESA Council. It is composed of two delegates from each of the member states and is complemented by ministerial level meetings periodically. Depending on the importance of the issues, decisions are taken either unanimously, by a two-thirds

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9. ibid.,

majority or by a simple majority. Thus, in certain important cases this flexible arrangement avoids vetoes that could impede the smooth running of the agency.[10]

At the next level of the hierarchy is the Director-General of the ESA operating from its headquarters in Paris. He is the Chief Executive of the Agency and its legal representative. He is responsible for the management of the Agency, execution of the programmes, implementation of the policy formulated by the ESA Council, and the attainment of its objectives in accordance with the ESA Convention and the directives issues by the Council. He coordinates the activities of the programme boards of various application projects; the Administrative and Finance Committees, the Industrial Policy Committee and the Science Programme Committee. The ESRO system of a programme board for each of the application project was maintained but the mandatory science programme became the responsibility of a Science Programme Committee. The ESRO Working groups on Astrophysics and Solar system were augmented by working groups on life sciences, material sciences and space telescope - representing the expanding

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10. Ralph Chipman, The World in Space: A Survey of Space activities (New Jersey: Prentice Hall Inc. 1982), p.588.

boundaries of space science of concern to ESA.[11]

Budgetary Aspects of ESA.

The ESA's annual budget is financed by scaled contribution from its member states to the mandatory activities. This is calculated on the basis of gross domestic product of the individual member states. For the optional programmes contributions are made on an ad hoc basis. Thus, each participating nation in a particular optional programme determines its contribution. The non-member states participating in individual programmes contribute at a rate agreed upon mutually.[12]

A major part of the member states'contribution is in turn paid by the ESA to European manufacturers of satellites launchers, ground stations and sub-contractors of other equipment and services needed for its joint space programmes. Following the principle of 'juste retour', the industrial work involved is shared in a manner commensurate with the financial contributions of each member state. This association of European industry in the implementation of Agency's

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11. Harrie Marrie and Robins, M.O., n.3, p.240.

12. "Space activities of the United Nations and International Organizations: A review of the activities and resources of the United Nations of its specialised agencies and of other competent international bodies relating to peaceful uses of outer space", A/AC.105/358 (New York:United Nations

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programmes, assures the former a high return on investments of participatng nations, thus furthering ESA's goal of improving the worldwide competitiveness of European industry.[13] The steady growth in ESA's budget from $720 million in 1981 to $1 billion in 1985, $1.2 billion in 1986, and $1.5 billion in 1987 is a clear indicator of the expanding activities of ESA that includes Ariane-5, Hermes, Columbus and a broadened space science programme.[14]

With a decision making body and the budgetary principles being distinctly regional in scope the ESA acquired an independent European character.

ESA: Its independent European character and international role -

The ESA is an inter-governmental international organization fostering cooperation among European countries by facilitating them to finance, develop, and execute space projects in common. Its priorities

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Publications, 1986), p.118.

13. Helen Wallace, "Building a European Space Policy", Space Policy, Vol.4, No.2, May 1988, p.116.

14. Aviation Week and Space Technology (New Jersey), Vol.126, No.10, 9 March 1987, pp.127-9.

are set through the joint political will of the member states. It succeeded in pulling together the primary scientific, industrial and public policy elites in the field of space research on a regional scale. Such organizational coherence afforded Europe an effective instrument to ensure its presence in the field of space research thereby securing a political independence that no member state could have attained on its own.

The establishment and the functioning of ESA has involved many legal arrangements, Memoranda of Understanding, etc. Thus ESA has a distinct international legal personality as an inter-governmental organization.[15] Therefore it is under continual obligation to define its responsibilities and those of its member states, to the United Nations, in accordance with Art.VI (responsibility for outerspace activities), Art.XI (obligation to inform the UN about the nature, conduct, location and results of such activities) and Art. XIII (the provisions of

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15. Roy Gibson, "Law and Security in Outerspace, International Regional Role - Focus on the European Space Agency", Journal of Space Law (Mississippi), Vol.11, No. 1&2, Spring & Fall 1983, pp.15-20.

outer space Treaty being applicable to inter-governmental organizations) of the outer space Treaty, 1967.[16]

The ESA participates in the formulation of International Space regulations at two levels (a) encouraging and organizing consultation between its member states, (b) direct representation at meetings of COPUOS and other international meetings.

Within the ESA, while ESA Council formulates the broad policy matters, the International Relations Advisory Committee (IRAC) is responsible for all matters related to the UN and particularly the outerspace community. Due to the concrete interests of ESA it tends to focus attention only on the more practical and real problems in it working. In the light of this fact, the influence exerted by the ESA through IRAC can be better appreciated.

The relevance of international discussions to space activities came into a sharp focus during the preparation for 'World Administrative Radio Conference' (WARC) in 1979. At this point, the ESA acted as a

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16. For details, see, Text of the "Outer Space Treaty," 1967.

focal point for member states undertaking a great deal of preparatory work that would have been difficult for some countries to manage with their own resources. The ESA played the role of a European secretariat acting as a clearing house and as a source of technical advice to member states.[17]

Programmes of ESA:

The programmes of ESA are broadly categorized into

a) Scientific programmes

b) Applications programmes and

c) Resources or in-orbit infrastructure programmes

a) Scientific Programmes:

The scientific programme of ESA is the core of ESA's activities, being included as a mandatory activity under Art.V and XI of the ESA Convention. The Science Programme Committee (SPC) oversees these activities with the basic aim of expanding the horizon of space research in Europe and enabling the European scientific community to remain in the vanguard of space research. Five working groups on Astronomy,

17. Roy Gibson, n.15.

Solar system, life sciences, material sciences and Space Telescope assist the SPC, corresponding to the broad areas of its research. The specific areas of space research alongwith the satellites aiding them are: Gamma Ray astronomy (Cos-B), magnetospheric research (GEOS-1 & 2, ISEE-1, ISEE-2 & ISEE-3), astronomical research in ultraviolet range (International Ultra Violet Explorer, IUE), investigation of Celestial sources of X-rays (EXOSAT), research of space above solar pole (Ulysses), astronomical research of celestial bodies (Space Telescope, Hipparcos), and investigation of Hailey's Comet (GIOTTO)[18]

Besides, the Rome ministerial meeting of ESA approved a long-term space science programme "Horizon 2000", consisting of two space science missions, Solar and Heliotrophic observatory (SOHO) and CLUSTER. While the former is a multi-disciplinary mission to investigate Sun's atmosphere and associated phenomena by remote sensing, the latter is proposed to investigate Earth's plasma environment and associated turbulence. Both these missions are part of a planned International Earth-Sun interaction study involving Europe, U.S. and Japan, to be launched in the

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18. U.N. Report, n.12, pp.119-24.

1993-95 time period.[19] The latest of the ESA's space science project is the Cassini/Titan joint mission in collaboration with NASA scheduled for launch in April 1996. This mission is proposed to investigate Saturn's moon Titan and its nitrogen rich atmosphere for pre-biotic molecules which could provide clues to the origins of life on Earth.[20]

Applications Programme:

The applications programme is categorised into Earth Observation Programme and Telecommunications programme.

As part of the Earth Observation programme ESA developed weather satellites to investigate scientific phenomena in Earth's atmosphere and disseminate to users images and meteorological data obtained by processing (METEOSAT-* & 2, SIRIO-2). Further, the remote sensing mission includes the launching of European Remote Sensing Satellite (ERS) series. These have a variety of applications such as crop inventories

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19. Aviation week and Space Technology, Vol.125, No.9, 3 March 1986, p.76.

20. Nature (London), Vol.336, No.6198, 1 December 1988, p.415.

and production forecasts water resources management, monitoring of river banks and coastal areas, fisheries marine currents and pollution.[21]

Under the Telecommunications programme ESA launched Orbital Test Satellite (OTS) in 1978 as a forerunner to the Operational European Communications Satellite (ECS) series. The main objective of this programme is to set up a network of links for both traditional services (telephone & TV) and new specialised services (teleconferences, data transmission, etc.) and make them available to European postal, telecommunications and radio administrations. The European Communication Satellites (ECS) are designed for a European regional operational system in the fields of TV transmission, trunk telecommunications between member states and exchange of data between off-shore oil rigs and coastal stations. A separate body the European Telecommunications Satellite Organization (EUTELSAT) was established to manage these operations with five ECS satellites.[22]

As part of the 'second package deal', a maritime Communications Satellite (MARECS) was proposed. The MARCES-A and MARCES-B were launched in December 1981 and November 1984 respectively and are part of the

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21. U.N. Report, n.12, pp.124-6.

22. Ralph Chipman, no.10, pp.591-2.

application programme to improve communication and safety, and overall efficiency of maritime operations through the use of communications satellites.

The latest in the telecommunications programme of ESA is the large multipurpose communications satellite 'Olympus'. It is designed for direct-to-home television broadcast and has a large platform to accommodate multi-element payloads future missions on a competitive basis.[23]

Space Transportation Systems:

The ESA's launcher development programme consisting of the Ariane series of rockets are designed to provide Europe with an independent and competitive launch capability, both for its own scientific and application satellites, and for a share in the extensive market for launchings. The initial version of this rocket Ariane-1, a three stage rocket with a payload capability of 1900 Kg. in geostationary orbit became operational in 1981.[24] An improved version, Ariane-4, with six configurations and a payload capability of upto 4,300 kg. in geostationary orbit is the mainstay of the present ESA's launch programme. A further version, Ariane-5

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23. U.N. Report, n.12, pp.128-9.

24. New York Times, 19 June 1981.

is still in the pipeline. France proposed Ariane-5 with a payload capability of 15 tonnes into low Earth orbit and 8 tonnes into geosyndronous orbit. The development plan put forward in ~~ather~~ 1984 would cost $1.1 billion and is scheduled to become operational by 1995.[25]

In addition, ESA initiated the Future European Space Transportation Investigations Programme (FESTIP). This programme was organised for systems studies and development of major enabling technologies for the next generation of fully reusable launch vehicles. The need for new launch vehicle arose from shortcomings in the space scenario. The space shuttle, Ariane-5, etc. could provide the ability to launch large payloads to low orbit and medium payloads to high orbits. But neither of them offered a low cost means of transporting crews to and from space station, and repair or assemble spacecraft in orbit. This need for a low cost Space Transportation System (STS) was accentuated by the ESA's plans for three orbiting platforms carrying experiments.[26]

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25. Defense Daily (Washington, D.C.,), 18 October 1984.

26. Patrick Collins and David Ashford, "An Alternative to Hermer", Space Policy, Vol.4, No.4, November 1988, pp.285-6.

The response from different European countries to the future STS was overwhelming. The French Space Agency (CNES) proposed the Hermes manned spaceplane in November 1985, as a means of carrying men and material to and from orbiting space station. It has a 90-day in-orbit capability, 4.5 tons payload, and is stated for launch in 1995. On the financial plane, France has agreed to sponsor 50% of the F.Fr.1700 million programme.[27]

The British proposal of a Horizontal Take-off and landing (HOTOL) Spacecraft was extended as another low-cost model fof the future STS in Europe. The proposed HOTOL spacecraft was to be a single, stage-to-orbit reusable shuttle and become operational by 2005.[28] Further, West Germany has proposed the Sanger spaceplane to the ESA as an alternative to US' Space shuttle, the British HOTOL and the French Hermes with its operating date - 2004 A.D.[29] The contest between the French Hermes Spaceplane, British HOTOL and West German Sanger was evident, at the 37th meeting of International Astronautical Federation in Innstruck, Austria. This meeting provided a forum for the debate over the relative merits of the three systems. Underlining the crux of the

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27. Flight International (Surrey, U.K.), 2 November, 1985.

28. Flight International, 21 June 1986.

29. Aviation Week and Space Technology, Vol.125, No.28, 28 July 1986.

debate the British delegate Roy Gibson, a former Director-General of ESA remarked, "whether it's HOTOL or Sanger or whatever, I don't really much care. But its got to get the price of launches down."[30]

Based on the short gestation period and the urgency of an independent European capability for a reusable spacecraft the ESA Council adopted the Hermes spaceplane programme in its multinational framework. in June 1986. A $50 million preparatory programme came into effect in October 1987 and it formally entered the ($530 mm) definition phase on 1 April 1988 aimed at achieving the spaceplane's initial unmanned flight in mid 1997 followed by manned missions in the first half of 1998.[31] The French company Aerospatiale was chosen as the prime contractor for the Hermes programme.

In-Orbit Space Infrastructure.

The in-orbit space infrastructure comprises of the Spacelab, the European Retrievable Carrier (EURECA), the Columbus programme as the International Space Station (ISS) programme, in collaboration with the NASA. These offer diverse working-in-space capabilities like such as astronomical research, demonstration of

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30. Defense Daily, 16 October 1986.

31. Aviation Week and Space Technology, Vol.127, No.14, 11 April 1988.

advanced remote sensing systems, microgravity research programme in materials sciences, life sciences and fluid physics for practical applications.

Spacelab:

The Spacelab programme incorporated since the establishment of ESA in 1975 was executed jointly by the ESA and NASA on 28 November 1983, with the space shuttle Columbia. As an integral part of space shuttle system, Spacelab is a reusable short-stay space-station with durations of 7-30 days. The spacelab concept involved two elements - a pressurized module as an environment laboratory, and an unpressurized pallet as an observing platform permitting direct exposure of instruments to space. It's main objective was to provide facilities for experimenters to conduct orbital experiments.[32]

The first Spacelab mission (SL-1) in November 1983 consisted of 58 European experiments (of the rest 12 were from US and 1 Japanese) in different fields. They ranged from research in ultraviolet and X-ray radiation sources in the universe, earth's plasma environment, measurement of Sun's energy output, microgravity experiments in fluid physics, crystal growth and metallurgy; evaluation of friction under

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32. Ralph Chipman, n.10, p.592, Also see, UN Report, n.12, pp.132-3.

microgravity conditions and investigation of effects of space environment on human physiology and on organization of biological systems. A German researcher Ulf Merbold was the ESA's Payload specialist for the SL-1.[33]

EURECA:

As a Spacelab follow-on Development Programme, ESA undertook the development of European Retrievable Carrier (EURECA) in January 1985. It is a free flying satellite launched and retrieved by the space shuttle and was proposed as an optimum solution to bridge the time between the Spacelab and the future space missions. With a payload capability of 1000 Kg. EURECA is designed for microgravity research such as growth of crystals and investigation of growth histories of botanical speciments - thus complementing Spacelab and playing a key role in ESA's future microgravity research programmes. Another experiment concerns Spacelink, whereby data from EURECA is transferred to Earth at high rates via the geostationary satellite 'Olympus'. The prime contractor for EURECA is West Germany's Masserschmitt-Boelkow-Blohm (MBB), which leads a multinational industrial team working on the programme.[34]

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33. David Shapland and Michael Rycroft, Spacelab: Research into Earth Orbit (Cambridge: Cambridge University Press, 1984), pp.117-52.

34. ibid., pp.165-7. Also see, Aviation Week and Space Technology, vol.125, No.22, 9 June 1986.

The Columbus Programme:

The Columbus programme is the European response to the American invitation to participate in an International Space Station Programme (ISS), to be operational in the early 1990's. The ESA Council ministerial level meeting at Rome in January 1985 approved this proposal and instituted a two year Columbus preparatory programme.[35] It formally entered the definition phase on 1 January 1988 as approved by the ESA Council resolution on long-term space plan.[36]

Columbus is essentially a programme to develop, operate and utilize an ensemble of in-orbit infrastructure elements. It consists of an Attached Pressurized Module (APM) providing opportunities for crew interaction with microgravity experiments, a free flying Polar Platform (PPf) for Earth observations; a Man Tended Free Flying Pressurized Laboratory; and one small free flying platform, Eureca-B.

The MTFF is the centrepiece of Columbus programme. It will provide Europe with a laboratory for the conduct of microgravity research in materials and life sciences. Simultaneously, MTFF will also be used as an in-orbit test bed for the development of new

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35. U.N. Report, n.12, pp.134-5.

36. ESA Council Resolution, n.8.

technologies in the area of automation and robotics.[37]

In sum, the Columbus programme represented ESA's efforts to develop and operate a set of low tariff (LEO) infrastructure element. The main objectives of this programme were two-fold. The first objective was to create autonomous European facilities for the support of man in space. The second objective was the furtherance of international cooperation through significant participation, with the US, in the International Space Station. These two were not mutually exclusive objectives but the first one is overriding in nature. Thus the U.S. - European collaboration in space has to be seen in this mixed context of cooperation and competition, as complementary rather than contradictory.

An assessment of the European Space Programs.

All the programmes of space technology described above were not merely technological events occurring at random. They involve clear policy objectives.

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37. Philip Chandler, "The Columbus Programme: European Steps towards the considered development of near-Earth Space", Space Policy, Vol.3, No.4, November 1987, pp.335-7.

Ariane Programme:

The Ariane rocket programme proposed by the French was closely related to the French perceptions of the broad Euratlantic partnership in general and technological pre-eminence in particular. Within the alliance they asserted the total autonomy for Europe and an equal status with the U.S.[38] An independent launcher capability was seen as vital to the autonomy of European technological prowess[39] and hence the need to break the duoply of space powers — U.S. and U.S.S.R.[40]

In marked contrast to the French perceptions, the US perceived itself as a 'primus interpares', entering into collaborative agreements with the Europeans on its preferred terms. The U.S. Collaboration with Europe in space consisted mainly of the offer of its launch services to European payloads involving minimal transfer of technology. In this light, the incorporation of French Ariane rocket as the European launcher during the inception of ESA consisted of the harmonization of the common European vision of

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38. John M. Logsdon, "US-European Cooperation in Space Science: A 25 year perspective", Science (Washington, D.C.,), Vol.223, No.4631, 6 January 1984, pp.11-16.

39. Helen Wallace, n.13, pp.115-16.

40. Stephen F. Von Welck, "Dominance in Space — a new means of exercising global power?" Space Policy, Vol.4, No.4, November 1988, pp.323-27.

space capability with the French national space policy of an independent launch capability on the same lines as 'force 'de frappe'.

The Maritime Communications Satellite:

The development of maritime communications satellite was one of the four major issues agreed upon at the establishment of ESA, representing the British interests. Among the optional programmes of ESA, Britain has concentrated on the development of communications satellites.[41]

Being a nation with large maritime interests, Britain proposed the MARECS for improved communications, safety, and the overall efficiency of maritime operations through the use of communications satellites. This proposal for application programme was based on the emphasis of British space policy on a realistic appraisal of costs and of scientific, technological commercial and other benefits that may be secured from space activities.[42] This explains the British quest for self reliance in the communications satellite technology even though it preferred US rockets for

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41. "UK Space Policy: Government report to the House of Lords Committee", 28 July 1988, in Space Policy, Vol.4, No.4, November 1988, pp.358-60.

42. ibid.,

launch services in view of an economical operation. Participation in the US INTELSAT was clearly unsatisfactory due to

a) high servicing charges for operations

b) absence of latitude to cater to the specialised needs, and

c) absence of any transfer of technology element thus entailing a dependent relationship.

The incorporation of the communications satellite in the ESA programmes thus represented the British interests in application programmes coinciding with the broad European need for space services in telecommunications, remote sensing, meteorology, etc. These needs are included under an expanded network of five European Communications Satellites (ECS) presently.

In-Orbit Infrastructure Programme:

The in-orbit infrastructure programme, as referred to earlier, represented the German interest[43] in working-in-space capability. However, lacking the

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43. For instance West Germany contributed more than half of the $750 million half being shared by the rest of the ESA members. For details see, Peter Marsh, The Space Business (Harmondsworth: Penguin, 1985), pp.157-8.

enormous means to launch heavy payloads, the ESA was dependent on the NASA for implementing this programme. Two elements were evident as a result of ESA's infrastructures policy. Firstly, the Spacelab, and then, the Columbus programmes elicited a uniform response from all the members of ESA towards the US space policy _ a policy element missing in the pre-ESA era. At a second level, the Spacelab programme highlighted the junior partner status of ESA. In exchange for free transit on space shuttle ESA built a reusable space-lab. Under the agreement the first mission was a joint mission with US and ESA contributing roughly equal amounts toward the experiments. But afterwards the hardware was to remain the property of U.S., who would charge ESA the commercial rate for using it again — the price the ESA had to pay for its novice status.

In sum the ESA has acquired wider-ranging capabilities in the field of space technology with an appropriate blend of programme content. It justifiably comprises the second league of space powers[44] — below the Superpowers and above the tier of developing countries — challenging the superpowers in the area of commercial programmes.

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44. ibid., p.3.

CHAPTER - 4

ESA, THE SUPERPOWERS, AND THE DEVELOPING COUNTRIES

CHAPTER - 4

ESA, THE SUPERPOWERS, AND THE DEVELOPING COUNTRIES

The ESA, with its diverse programmes has established itself as a second league in space politics. It chose to tackle the issue of space technology through a three pronged attempt in scientific space research, applications programme and experience in manned space activities. In the process of implementing its programmes, how did it relate itself to the first league? Answers to this question hold the key to European Space policy's cooperative and competitive orientation. It's cooperative slant towards the superpower space policies underline the quest to attain higher levels of space capabilities through functional mode. Its competitive orientation toward the superpowers explain it's desire to assert autonomy in the specific technologies which have been mastered.

A specific instance is the commercial launch services where ESA's Ariane competes with NASA's and Glavkosmos' services on an equal footing. Stressing the issue of autonomy the European Parliament Resolution on European Space Policy noted that, "without autonomy in space operations Europe will be unable to derive full economic benefits from the scientific discoveries and technological innovations which it makes in the sector and will fail to provide future generations of European scientists and engineers with outlets

for creative achievement commensurate with their talents".[1]

Nevertheless in one aspect of the space activities there is a note of complementarity between the superpowers. This concerns their utilisation of space for national security purposes by both the US and the USSR.[2] Quite the contrast, the European Space Policy is wedded to the principle of peaceful cooperation in space with a view to their use for scientific purposes and operational space applications. In this chapter attempt has been made to posit the European Space Policy with the super power policies on these two aspects. Further effort has been made to answer the question that would have more relevance to the our country: How did European Space Policy relate itself to the third league of the International Space System? (comprising of developing countries with budding space programs and those needing space related services for their developmental programmes), with particular reference to India.

Soviet Space Policy

Ever since the launch of Sputnik in 1957 ushering in the space age, the Soviet Union has embarked on an active

1. "European Parliament Resolution on European Space Policy, 18 June 1987", in Space Policy, vol.4, no.1, February 1988, pp.89-90.

2. Paul B. Stares, Space and National Security (Washington D.C.; The Brookings Institution 1987), pp. 8-44.

programme directed toward basic research, and to practical uses for both civilian economic and military projects. In an intensely cold war atmosphere, the Soviet programmes demonstrated a long term tendency to establish dominance in space and use it as a new high ground for additional means to exercise control of, and influence on Earth.[3] In tune with it's strategic doctrine of massive retaliation, it utilised the space technology to manufacture and stockpile a vast array of Inter Continental Ballistic Missiles (ICBM). It thus entered into a 'missile race' or the 'delivery systems race with the US, which climaxed in the cuban missile crisis of 1962. In addition to the delivery systems the military use of space technology for national security purposes included satellites for weather forecasting, earth mapping, navigation aids and communication satellites for the effective use of widely dispersed military units and improving the functioning of air offence and defence systems. The reconnaissance satellites aid in the intelligence gathering, arms control monitoring and early warning of surprise attacks through electronic & photographic reconnaissance.[4] The Soyuz, Proton series of launch rockets and

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3. Stephen F., Von Welck, "Dominance in space - a new means of exercising global power?" Space Policy, vol.4, no.4, November 1988, p.325.

4. For details see Charles, S. Sheldon, Review of the Soviet Space Program : with comparative United States Data (New York : McGraw Hill 1968), pp.46-78.

and the Salyut, Mir Space stations are put to diverse purposes like reconnaissance, remote sensing, biological research and manufacturing materials under microgravity conditions.[5]

The Soviet Union has a large range of launch vehicles to place large payloads into space on a routine basis (Soyuz, Proton, Energia etc).

A major goal of Soviet Space Policy is the permanent presence of human beings in space. The Salyut Space stations since 1977 and the Mir station since February '88 served as manned space modules. By May 1988 the Soviet cosmonants had spent over 5300[6] days in space as part of the regular programmes of human endurance in space.

Like US, the USSR uses satellites for acquiring defence information and supporting its armed forces. With the aid of reconnaissance or telecommunications space technology applications, neither of which are aggressive in character. These objectives are met with the aid of a large fleet of optical and electronic intelligence gathering satellites and modern communications satellites with future plans for a large platform in low Earth orbit. This

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5. Alain Dupas, "The USSR's prudent space policy," Space Policy, vol.3, no.3, August 1987, pp.240-41.

6. Stephen F., Von Welck, n.3, p.325.

platform is to be equipped with sophisticated sensors and modern electronic devices for continuous observation of the Earth - with major consequences for its capacity to control Earth from space.[7]

Previously, information on Soviet Space Programmes were not publicised by that country. Much depended on NASA's intelligence gathering measures. But under Gorbachev's leadership there was a marked shift in the Soviet Space Policy. The launch of Energia rocket was broadcast on Soviet TV alongwith details of its launcher characteristics.

The new posture of the Soviet Space Policy puts more emphasis on non-military aspects and exhibits the desire to work with Western countries on space science projects.[8] Specifically the 10 year cooperation agreement between Britain and Soviet Union is an example of this trend. This agreement was signed on 31 March '87 for the study, exploration and use of outer space. The terms of this agreement provided for the establishment of a working group to explore solar, terrestrial and planetary physics collaboration and

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7. Ibid.,

8. Joan Johnson Freese, "Changing Patterns of International Cooperation in Space : The Soviet Factor", Space Policy, vol.4, no.1, February 1988, p.60.

the participation of British scientists in the Soviet Union's PHOBOS Project on Mars.[9] Besides, Soviet Union's collaborative ventures in Europe include the Franco-Soviet project ARAGAT for the month long flight of French cosmonant aboard Mir station, and VESTA, a joint probe mission to Mars and certain asteriods.[10] An extension of this policy was manifest in the establishment of separate agency Glavcosmos to improve the management of Soviet Union's civilian space programmes.[11] It further seeks to streamline the interface between Soviet Union and the developed and developing countries for scientific and commercial space ventures. While interaction with developed countries yields exposure to technology, interaction with developing countries brings desirable linkages that are primarily political in nature.[12]

US Space Policy

The initial US Space Programme started within the Department of Defense. But after the Sputnik launch in 1957 (4 October) the management of US Space Programmes was more

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9. Text of the UK, Soviet Space Agreement, Space Policy, vol.3., no.3, Augugst 1987, p.267-68.

10. Alain Dupas, n.5, p.243.

11. Aviation week and Space Technology, vol.124, no.12, 24 March, 1986, p.77.

12. Joan Johnson Freese, n.8, p.69.

centralised and passed to the Advanced Research Projects Agency (ARPA). It coordinated both the defense activities and the civilian activities while the NASA was being formed. Consequently, the National Aeronautics and Space Administration (NASA) was established by the NASA Act in 1958 governing the US' space activities. NASA was assigned the primary role but not the exclusive role in pursuing the basic objective of technological excellence in outerspace research.[13] On parallel terms, the space activities related to the development of weapons systems were assigned to the Defense Department. This set-up clearly conveys the integrated nature of the US Space Policy encompassing the scientific, commercial and national security components. In particular, international cooperation in space is pursued by the International Affairs Division and the Department of space through the Technology Policy and Space Affairs Office of the Bureau of oceans, and International Environmental and Scientific Affairs.

Under the Eishenhower administration the US space policy was preoccupied with an active programme to develop and manufacture the delivery systems for the Intercontinental Ballisitc Missiles (ICBM's).[14] After the Delivery systems race climaxed in the 1962 Cuban crisis, the emphasis of US

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13. Charles S. Sheldon, n.4, pp.79-82

14. Ibid, p.79.

and the Research and Development in Advanced Communications Technology for Europe (RACE) while the ESPRIT programme focusses on microelectronics, software technology, advanced information processing and computer aided production. The BRITE programme concentrates on laser technology,,new materials , catalysis and particle beam technology. The RACE programme is envisioned to supplement ESPRIT by creating a vast broadband integrated communication network (IBC)[25].

In its functional aspect, the EUREKA constitutes the basis for political collaboration and decisions at ministerial level-based on the reports of various consultative work groups. As a stimulant to the European research and development (R&D) it enhances the interface between European laboratories and universities in the fields of information technology, new materials and biotechnology. Further Eureka helps coordinate market oriented action by stimulating the relevant sectors of private industry.

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25. ibid., pp.311-23.

An assessment of the Eureka programmes makes it clear that its main focus was on civilian technology. The French Defence Minister Charles Hernu remarked, "there is a single technological true of which the civilian and military spheres are branches. It is the scientific and technological basis which we must not only support but also expand and enrich. This is the meaning of Eureka Porject".[26] As such, the Eureka is not comparable to the SDI, leave alone the argument that Eureka is a direct response to SDI. Distinguishing the motives of the two programmes Matre, the Director of Aerospatiale noted that, "There is no similarity between the Eureka and the American project. The objectives are radically different. SDI is an American programme which concerns American defence. Europe cannot stay behind in the development of its own technologies and, without declaring war on the United States we have to show that Europe will control the basic technologies necessary to maintain its position in the world".[27]

This account of the SDI programme with overriding national security aims and the European response to its technological spin-off effects clearly sets a demarcating

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26. Daalder, n.20, p.93.

27. Brauch, n.24, p.163.

line between the two. To the extent Eureka supported the European Space Agency, it was only in creating an effective interface between the industries involved and not as a direct response to the American space initiative. The following section examines the peaceful orientation of the European space policy and helps explain the civilian nature of both the ESA and EUREKA activities.

European Perspectives of Military Space Applications

In contrast to the Superpowers' perceptions of the space as the new high ground providing additional means to control and influence the Earth, the general principle underlying European Space Policy is the use of space for peaceful purposes. Article II of the ESA convention describes the purpose of the agency as providing for and promoting peaceful cooperation amongst member states in space research and technology, and their space applications with a view to their use for scientific purposes and operational space applications.[28]

The European Parliament resolution on European Space Policy further reiterated the broad principles as being for a) peaceful purposes, b) real benefit in terms of an

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28. Harrie Massey and M.O. Robins, History of British Space Science (Cambridge : Cambridge University Press, 1986), p. 237.

economic return or an increase in scientific knowledge and human well-being, and c) where practicable be open to international cooperation.[29] These basic principles explain the absence of national security component in the European Space Policy, and in its programmatic content. In contrast to the first league's strategic orientation, the second league laid emphasis on the peaceful technological and commercial aspects of space technology. It's aim of improving the worldwide competitiveness of European space industry and the desire to exploit the advantage of free competitive bidding brought it into direct competition with the first league in the commercial space activities.

Commercial Aspects

The commercial ventures in space refer to the vast market for satellite communications equipment, remote sensing satellites, remotely sensed data, launch services and space related insurance business. Historically the Soviet Union and the US have been dominant in this area of space business with their cumulative experience in space research. The American participants in space business include not only the NASA but also private agencies such as

29. "European Parliament Resolution on European Space Policy", n.1, p.90.

Transpace carriers, offering launch services on Delta rockets; the General Dynamics, offering services with Atlas Centaur rockets and the International Telecommunications Satellite Organisation (INTELSAT), for leasing communications satellites.[30] The Soviet Union initially offered launch facilities to its East European partners and other developing countries, based on bilateral cooperative agreements. For purposes of better coordination it created the civilian space agency 'Glavcosmos' offering services even to Western countries.[31] The European contender in the space launch business is Arianespace, a semi-private company marketing launch services of ESA's Ariane rockets. In launch services, the Ariane has emerged as the main rival to the US vehicles. By mid-1984 Arianespace had firm orders for 28 satellite launcher[32] which rose to 59 launch contracts by December 1986. In the year 1986 alone it captured 46 per cent of the commercial space launch market amounting to 18 launch orders worth $ 950 million.[33]

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30. Peter Marsh, The Space Business (Harmondsworth : The Penguin Press, 1985), pp.4,205.
31. Freese, n.8, p.69.
32. Marsh, n.30, p.199.
33. Interavia Airletter (Geneva), 13 February, 1987.

Setbacks in the shuttle programme indirectly helped the marketing efforts of Arianespace. This highlighted the fact that though the expendable rockets are technologically less sophisticated, they are simple, and on balance less likely to go wrong.[34] Further the manpower requirement for the shuttle are greater than that of Ariane. The processing time for customer pay loads for shuttle is 13 weeks compared to 8 weeks for Ariane. Thus by maintaining fixed costs and schedules and ensuring timely delivery of communications packages, Ariane proved preferable for commercial launch services.[35]

The commercial distribution of ESA's remotely sensed data is made by the European consortium 'Eurimage'. It was formed in 1985 through an agreement between Britain's Hunting Technical Services, Italy's Telespazio France's Spot-Image, Sweden's Satimage and the West German company DFVLR. It distributes the remotely sensed data of the European Remote Sensing Satellites ERS-I and ERS-2 to European costomers through the National points of contact

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34. Marsh, n.30, p.198

35. Michael T. Lyons, " Ariane versus the shuttle : a user's rationale", Aerospace America (Washington, D.C), vol.23, no.5, May 1985, pp.66-68.

policy was on the moon race with Soviet Union through its Apollo programme. As President Kennedy emphasized, "No single space project in this period will be more exciting, or more impressive to mankind ... in a very real sense it will not be one man going to the moon ... it will be an entire nation."[15]

As these developments underline, the US space policy views space as an important area for it's national security purposes. It's military space programme includes nearly 75 sophisticated satellites for various military support missions. They include intelligence gathering through photographic and electronic reconnaissance, early warning of attacks, arms control verification, communication, navigation, weather-forecasting and geodetic missions. In addition, an extensive network of ground stations maintain and monitor their operations as well retrieve, process and disseminate the information collected or transmitted by the satellites[16]. The whole programme is under the direction of National Security Agency.

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15. Quoted in, William R. Kintner and Harvey Sicherman, Technology and International Politics - The Crisis of wishing (Massachussetts : Leington Books, 1975), p.127.

16. Stephen F. Von Welek, n.3, pp. 323-25.

Strategic Defense Initiative and the Eureka

The declaration of SDI research programme on 23 March 1983 marked the beginning of a new era in US space. policy. This research programme, having an ultimate aim of providing a space based security shield to destroy nuclear missiles before they reached their targets, received a mixed response from its European allies. It called for an extensive presence in space in the form of satellites, platform and space stations, underlining a close relationship with the US' space programme.[17] This US perception of using space technology for national security purposes sharply contradicted with the ESA's convention which laid emphasis on peaceful research and applications of space technology.

The unilateral announcement of SDI programme without consulting the Eurppeans raised doubts among them about the US' readiness to take its allies concerns into account, and the view that SDI is intended primarily to defend tne US.[18]

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17. ibid.,

18. Arnold Kanter, "Thinking about the strategic Defense Initiative : an alliance perspective", International Affairs (London), vol.61, no.2, Spring 1985, pp.451-54.

The nature of participation by the Europeans was also an area of contention between the allies. The hopes of European firms to gain major economic benefits remained unfulfilled as their participaton was limited to the role of subcontracting.[19] For instance, between January and April 1986 a total of $746.9 million SDI contracts were awarded, of which less than one per cent went to the European front.[20] The aspirations of European scientific community to gain access to state-of-art technologis such as lasers, new materials , advanced computer software and hardware, etc. remained unfulfilled due to the double shiedling of the US techology transfer practice. The restrictions of COCOM were further supplemented by the Export Administration Act (EAA) passed in 1979. It provided for the control of exports in order to protect national security and for the promotion of U.S. foreign policy goals.[21] Quoting these provisions the US argued that any relaxation and

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19. Walter Zegueld, and Christien Enzung, SDI and Industrial Technology Policy: Threat or Opportunity (London: Frances Pinter, 1987), pp.37-45.

20. Ivo. H. Daalder, SDI and European Challenge (Cambridge, M.A.: Ballinger, 1987), p.83.

21. ibid., p.89.

casual approach of European controls exposes US high technology to the Soviet Union. These restrictions on European access to high technology involved in the SDI research effort led to a heightened perception of technology gap among the Europeans. As the then French Defence Minister acknowledged, "The beginning of SDI has already had a value, it has made the European countries aware of the magnitude of the American research effort in both the military and civil sectors. It has also made them see the necessity of preserving and harnessing their human and technological potential in order to protect their identity and to shape their destiny".[22] The general feeling was that the European countries should coordinate diverse and nationally based activities to meet the technological challenge posed by the SDI. It was to this problem that the French proposal of 18 April 1985 for the establishment of a European Research Coordination Agency (EUREKA) sought to address itself.[23] The rapidity of European response underlined the European concern with the technology gap and also the fact that EUREKA

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22. Interview with Charles Hernu, in, NATO's Sixteen Nations (Brussels), Vol.30, no.4, 4 August 1985, pp.42-46.

23. Daalder, n.20, p.92.

was not merely a traditional French response to a US proposal, with strategic undertones.

The EUREKA plan was formally adopted at the ministerial session of the Western European Union (WEU) in Bonn, on 23 April 1985.[24] The main objectives of the EUREKA programme were three fold:

a) Establishment of genuine European Cooperation in advanced technologies like microelectronics, optronics, new materials and laser technology;

b) To chart a detailed definition of common programmes in the areas of space, energy and oceanography;

c) The extension of technological innovation to traditional sectors where research has been limited and could become vulnerable.

The main programmes of EUREKA proposal are the European Strategic Programme for Research and Development in Information Technology (ESPRIT); the Basic Research in Industrial Technology for Europe (BRITE);

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24. Hans Gunther Brauch, ed., Star wars and European Defence (London: The Macmillan Press, 1987), p.318

in the respective countries. In addition, Eurimage markets remotely sensed data for operational use in developmental programmes to the developing countries in West and South Asia, and West and North Africa.[36] In these areas, the ESA's services compete directly with the American landsat services.

In the area of telecommunications the ESA's sister agency, the European Telecommunications Satellite Organisation (EUTELSAT) markets the services of the five European communications Satellite (ECS) netwerk. Designed for operations at the European regional level, it directly competes with the INTELSAT services in the European market for telephone services, direct TV broadcast services, and specialised services such as teleconferences, data transmission, etc. Besides, the maritime communication satellites MARECS-A and MARECS-B offering long range links between ships and land stations competes with the American navigation satellite (NAVSTAR), in the area of maritime communications.

In sum, the ESA's Ariane rocket has emerged as a commercial competitor to the NASA and the Soviet Union's Glavcosmos launch services. In the related services such as markets for remotely sensed data and services of communications satellites the ESA has asserted itself in the European arena, though not effectively on the global market.

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36. Interavia Airletter, 13 February, 1987.

This policy is in tune with the long term space policy of improving the worldwide competitiveness of Europe's space industry by taking advantage of free competitive bidding.

ESA's Policy toward the Developing Countries

From the broad perspective of an International Space System, the ESA's policy toward the developing countries refers to the question, How does the second league relate itself to the third league? The third league concerns those countries with budding space programmes and those lacking them, but at the same time needing the space-related services for their developmental programmes.

The European Space Policy toward the developing countries had two broad orientations within. At one level it has cooperative attitude toward their developmental programmes. At another level the ESA cooperated with the US in restricting the transfer of missile related technology to developing countries through the Missile Technology control Regime.

Needs of the Developing Countries

Most of the developing countries have immense problems such as mass illiteracy, natural disasters, problems of management concerning food crops, water, forestry, natural resources, etc. In the alliviation of these problems the

space technology has immense potential through various types of satellites. Nevertheless most of the developing countries lack the unfrastructure on which the applications of space technology can be based, ie., in terms of technical skills, managerial abilities and data handling. Mostly they depend on the space programmes of advanced countries or the commercial firms in those countries to build turnkey systems.

The communication satellites hold the potential to improve the domestic communications through telephone and television links between various parts of the country.

The remote sensing satellites provide satellite imagery data for utilization in different fields. In the area of agriculture they aid soil moisture monitoring, crop surveys, for irrigation scheduling. In forest management they aid in mapping forest vegetation, estimation of timber volume and measurement of the rate of depletion as essential steps in planning control measures. They further aid the exploitation of natural resources like minerals through geological mapping of Earth's topography.[37] The European consortium Eurimage signed an agreement with the ESA for the commercial distri-

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37. Ralph Chipman, The World in Space : A Survey of Space Activities (New Jersey : Prentice Hall Inc., 1982), pp. 496-500.

bution of remotely sensed data. They link up the remote areas of the country for purposes of better decision-making, and awareness of the unique problems of those areas. The French-German Symphonie I communications satellite facilitated the two year Satellite Telecommunications Experimental Programme (1977-79) in India and the Chisat system of China.

In the area of rural communications for social services and the literacy programmes the communications satellites aid the developing countries by helping them modernize their radio TV networks. These programmes result in large gains in information, awareness and knowledge in areas such as health and hygiene, political, consciousness, overall modernity and family planning.[38] The French-German TV Satellite was employed for the rural communications and social services in Peru and Cameroon.

In the area of food production the meteorological satellites help select the planting and harvesting dates by providing data on cloud formation, atmospheric movements and phenomena. They are further helpful in water regulation, ocean fishing, irrigation planning and early warning of tropical cyclones. The ESA's METEOSAT-I, METEOSAT - 2 provide meteorological data to West and

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38. ibid., p.503.

North African countries, besides the European nations.[39] The Eurimage markets the remotely sensed data to countries of West Asia, West and North Africa. Thus the ESA's cooperative orientation toward the developing countries had benefited them in the critical areas of their economies.

ESA and the Indian Space Policy:

The primary goal of India's space programme is the self-reliant use of space technology for national development. From a broad political perspective India's space policy is an integral part of the country's foreign policy.[40] The objective of self-reliance in its programme is in line with non-alignment policy and the Nehruvian view that self-reliance in science and technology is vital for socio-economic development.[41] Consequently the emphasis was on developing an indigenous base for space technology. This did not amount to renunciation of cooperation with other countries. It maintained a careful balance between cooperative space programmes,

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39. Pirard, Theo, "Benefits in space for developing countries", Aerospace International, Vol.16, No.2, May-June 1980, pp.55-61.

40. Stephen F. Von Welck, "India's Space Policy: A developing country in the space club", Space Policy, vol.3, No.4, November 1987, p.332.

41. Anitha Bhatia, "India's space program: Cause for Concern?" Asian Survey (Berkeley), vol.25, no.10, October 1985, p.1014.

avoiding a concentration of space cooperation with one particular country in order to maintain its independence. The main thrust of the programme are in three broad areas:

a) Satellite based communications for various applications;

b) Satellite based resources survey and management, environmental monitoring and meteorological applications; and

c) Development and operationalization of indigenous satellites, launch vehicles and associated ground segment for providing these space based services .[42]

With these thrust areas the Indian space programme has evolved through three phases. In the initial phase beginning with the establishment of the Indian Council for Space Research (INCOSPAR) in 1962, the main objective was to establish necessary infrastructure to manage and operate a viable space programme.[43] The European contribution to this phase lay in the Commonwealth Consultative Space Research Committee initiated by Britain. It was formed at the same

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42. Department of Space, Government of India, Annual Report, 1986-87, p.3.

43. Prakasham, K.P., Space Horizons (New Delhi: Sterling Publishers, 1981), pp.14-16.

meeting of COSPAR in Nice where European Cooperation was mooted. The Commonwealth Committee had three working groups on

a) tracking and data recovery;

b) vertical sounding rockets; and

c) Satellite ionospheric sounding. As part of this programme the bunching facilities were constructed at Thumba.[44]

In the second phase the main objective was to develop necessary experience to enable the design, manufacturing and operational teams to make the best use of the available technology. In this phase, the Satellite Telecommunications Experiment Project (STEP) was implemented for two years, from 1977 to 1979 using the Franco-German Symphonic satellite. This programme helped the Indian Space programme gather experience in operating and utilizing a geostationary satellite for domestic purposes.45

In the third phase starting 1979, an experimental

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44. Massey, n.28, pp. 163-68.

45. Welck, n.39, p.327.

programme to determine the type of launcher and satellite project needed to meet India's specific objectives was dominant. The ESA's contribution in this regard was the launch of geostationary communications satellite APPLE, with Ariane rocket in 1981. Further INSAT-IC was launched by Ariane in 1988 with three more Ariane launch opportunity reservations having been made for INSAT-ID, INSAT-IIA and INSAT-IIB for future launches.

In the area of remote sensing there is a mutual cooperative agreement between the ESA and the Indian Space Research Organization (ISRO). Under this agreement the ISRO acquires data from the ESA's microwave remote-sensing satellite (ERS) over India. On a reciprocal basis the ESA acquires data from ISRO's IRS Satellite over Europe. Further an information retrieval system installed by the ESA at National Aeronautical Laboratory (NAL) in Bangalore provides direct access to the ESA's data base in Paris.[46]

In sum, the European Space Policy related itself to the third league with a cooperative orientation on wide-ranging aspects of technology. Nevertheless the

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46. Department of Space, Government of India, Annual Report 1986-87, p.61.

European policy toward the export of so called dual-use space technologies is at variance. The term dual-use refers to the space technologies that could be put to either military or civilian purposes such as propulsion units, heat shields, lasers, guidance systems, etc.[47]

The Missile Technology Control Regime (MTCR)

While at one level the European Space policy was oriented towards cooperation with the developing countries by providing them space related services, at another level it cooperated with the U.S. in creating an informal mechanism to restrict the export of missile related space technology components.

The MTCR titled 'Guidelines for sensitive Missile Relevant Transfers', was agreed upon at the Group of seven (G-7) advanced industrial economies Summit meeting on 16 April 1987 (Canada, France, Italy, Japan, West Germany, U.K. and the U.S.).[48] Their objective was to agree on common measures to restrict the export of space technology necessary for the production of nuclear capable missiles. Legally these guidelines are

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47. Stephen F. von Welck, "The export of space technology: Prospects and dangers," Space Policy, Vol.3, no.3, August 1987, pp.226-28.

48. Text, "Missile Technology Control Regime", in Space Policy, Vol.3, No.4, November 1987, p.354.

not an inter-governmental agreement. They are a common commitment by the G-7 nations similar to the guidelines of the London Suppliers Club on export controls for sensitive nuclear technology. These measures were aimed especially at those developing countries which are on the verge of acquiring missile capability such as, Brazil, Egypt, India, Libya, South Korea, Taiwan, Israel and South Africa.[49]

The MTCR sets restrictions under two categories. The first category includes complete rocket systems with payloads of 500 Kg. and a range of 300 Km; major subsystems and their production facilities and equipment such as industrial rocket stages; reentry vehicles, solid and liquid fuel rocket engines; guidance sets and thrust vector control equipment. The second category covers less critical character technologies such as propulsion components, propellants, structural material, avionic equipment, launch and ground support equipment and facilities , missile computers, analog-to-digital converters and related software.[50] Export of category I production facilities may not be authorized at all. Transfer of other items may be authorized only on rare

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49. Welch, n.46, p.229.

50. Text of Missile Technology Control Regime, n.48.

occasions and on the undertaking by recipient government to use the item only for peaceful purposes and not be retransferred without the consent of exporting nation,[51]

However, from the viewpoint of developing countries the MTCR presents a conceptual linkage to the existing nuclear non-proliferation regime. It is perceived as denying them the fruits of advanced technology, and from an economic viewpoint, is seen as a kind of technology protectionism by the western supplier countries to prevent a distortion of competition on the international space technology market. Secondly, a major space power, Soviet Union is not a party to MTCR, rendering its provisions amorphous. Thirdly, since the MTCR gives each member full authority over implementing and interpreting its stipulations there is no guarantee that members will apply equally strict definitions in their regulations. Further, the MTCR ignores the knowledge component that is vital to any technology base. This becomes available through foreign missile specialists, companies and the expatriate engineers.[52] The association of German Orbital Transport and Rocket Company (OTRAG)

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51. Welck, n.46, pp.230-31.

52. Aaron Karp, The frantic Third World quest for ballistic missiles, Bulletin of Atomic Scientists, Vol.44, no.5, June 1988, pp. 16-18.

with Egyptian and libyan programmes clearly is a case in point.

This brings us to the question, why did Europe join the first league in imposing controls on technology transfers to the developing countries? This appears to be strange behaviour as Europe itself was given restricted access to the more advanced US space technology on the grounds that it would jeopardise the coordinating committee for Multilateral Export Control (COCOM) regulations.[53]

One interpretation of European behaviour could be the ESA convention provision that space research is predominantly meant for peaceful purposes (Art. II) Nevertheless, as pointed out earlier, the very nation that proposed the MTCR, the United States, has national security programmes in space. Hence a different set of norms for the third league that is sought to be implemented by the first (U.S.) and the second leagues (Europe) on the international space system tends to be discriminatory in nature.

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53. Daalder, no.20, p.88.

CONCLUSION

In the three decades after Second World War the European Space Policy has evolved from the stage of conception to inchoate institutional form in the first phase (1962-75). It acquired a degree of coherence later, under the ESA. Eversince the emergence of space technology as an issue area, the European countries had identified it as a potential area for regional cooperation. Thus by 1962 space technology emerged as a functional basis for regional cooperation with applications in a wide range of activities such as meteorology, astronomical research, remote sensing, communications etc. Nevertheless, the first phase was marked by European dependence on the US for launch services and hence was vulnerable to the pressure exerted by the American Space policy. The British preference of US launch services and the consequent weakening of the European space programme is a case in point.

The beginning of the second phase (1975-88) was marked by a redefinition of the European Space Policy. The formation of a single body, the European Space Agency, effectively ended the ambiguity in individual member-states perception, and hence their orientation toward the launcher and application programmes. The division

of ESA's activities into mandatory and optional programmes was directed at sealing the regional discords over the space policy. While the mandatory space science research ensured an effective European presence in scientific activities of space, the optional programmes gave the member states enough latitude to pursue programmes of their choice. In terms of it's achievements the ESA provided western Europe with a basic range of space capabilities such as independent launcher, and satellite construction for diverse purposes. It succeeded in pulling together the primary scientific, industrial and public policy elites in the field. It provided a focus for a pattern of industrial consortia to turn scientific and technological achievements in space into market responsive programmes through the Arianespace, EUTELSAT and Eurimage.

The European Space Policy formulated through ESA is one of the cornerstones of European efforts to manoeuvre toward greater autonomy in international relations. By elevating the standards of space research in Europe the ESA sought to adapt the regional system to the international space system. In terms of its influence on external situation the ESA helped Europe challenge the duopoly of superpowers in the area of

space research. Within the European community the pluralization of decision-making process involved in the ESA council enhanced the prospect of agreement by bringing to bear the more concrete interests and objectives represented by special groups the ESA participated in the formulation of international space law through the UN fora such as the 'Committee on the peaceful uses of outer space' and acquired the status of an international inter-governmental organization exerting major influence in international relations.

Significantly, the functional cooperation in space research in Europe was a consequence of the aggregation of technological interests in Europe. It also provided an opportunity for cooperation to reduce the technological gap between the US and Europe.

In terms of its content the European Space Policy has acquired a momentum and direction of its own and is conditioned essentially by the dynamics of regional politics. It collaborated with the first league (superpowers) in basic research and manned space research areas where it lacked the means and the experience. It competed with superpowers in space business related to the launch services, communication satellites, remotely

sensed data - areas where it had the capability.

The analysis of ESA's programmatic content reveals the absence of any military space applications. Indeed the European Space policy excluded national security component relating to European security or threat perception. Thus the European Space Policy differs from the superpowers space policy. Further, the ESA's commitment to the exclusion of national security aspect from space policy had its implications on its relations with the developing countries on the threshold of acquiring missile technology. It seems this principle had a role in influencing the European Space policy in the formulation of Missile Technology Control Regime and restricting the number of third league space powers.

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