INTRODUCTION

The aircraft industry is an advanced, complex technological industry that has a strong impact on other industries and, for the nation as a whole, it is a strategically important industry for strengthening international competitiveness through technological superiority. Developed countries throughout the world have been promoting the aircraft industry as an engine of continuous growth and development of advanced technology. The importance of the industry is acute in areas of maintaining superior defense technology, promoting rapid-growth industries, and improving productivity. In Korea, the industry is now in a period of growth, but this growth is still insufficient in light of Korea’s national economic potential and phase of development. We can see many countries that are similar to Korea in terms of economic scale or industrial level but have achieved significant advancement by pursuing a more active policy for their aircraft industry. Countries such as Taiwan, South Africa, and Brazil are good examples. These countries have already shown indigenous models of aircraft in the world market. In contrast, it is regretful that the Korean aircraft industry still remains at the level of simple fabrication or parts assembly though subcontracts with foreign manufacturers.

The economic crisis Korea is currently experiencing may be said to have originated from the fundamental weakness in the competi-
tiveness of Korean industry and technology. In order to increase national competitiveness and to prepare for the upcoming 21st century, the country strongly needs more investment in and policy support to research and development in diverse technical areas including the aircraft industry. Technology is an integral resource of a nation in maintaining its competitiveness, particularly under the economic and technological regime of the WTO (World Trade Organization) and the TR (Technology Round). Paul Kennedy stated in his book, *The Rise and Fall of the Great Powers*, that the rise and fall, the prosperity and decay of a nation depend on the industrial competitiveness achieved through technological innovation. In the case of Korea, considering the security concerns of the Korean peninsula and the rapidly changing international situation, constant development of key defense technologies and new weapon systems is more important than ever. More specifically, aircraft development capability constitutes one of the most essential concerns because future conflicts will be waged with the support of sophisticated air forces. An advanced aircraft industry will also play a leading role in transforming the Korean industry structure from one characterized by low wages into one using technology to increase national competitiveness.

With this in mind, I intend in this chapter to review the current status of the Korean aircraft industry and present several opinions regarding both the R&D challenge ahead of us and our strategies to respond to these challenges.

**CHARACTERISTICS OF THE AIRCRAFT INDUSTRY**

An aircraft industry can be characterized as an aggregate system integrating almost all the nation's high-technology industry products. While it has a wide impact on various fields of industry, the industry requires a high level of investment and long development times. An aircraft is a complicated system composed of electronic, electrical, mechanical, and other subsystems, in which the reliability of each system’s components is crucial. An aircraft can fly well when all the subsystems work reliably and interface with each other perfectly. Because constructing an aircraft is possible only when all related industries are well developed, the aircraft industry is generally prevalent among developed countries.
Several characteristics of the aircraft industry can be summarized as follows. First, an aircraft is a very complex and complicated system with many subsystems and components. Since compact, light, and multi-functional subsystems have to be integrated and interface well, constructing an aircraft can be defined as an integration of the subsystems in which high-technology experience is required.

Second, an aircraft must be highly reliable. Even a small defect in a component may result in a crash of the aircraft. No technical uncertainty is tolerated at any level of the system, i.e., at the component, subsystem, and system levels.

Third, the aircraft industry is a high-value-added industry based on specialized and technology-intensive labor. Most developed countries support the aircraft industry strategically to increase international competitiveness. To develop and produce aircraft, large-scale production facilities supported by significant investment and specialized technological labor are essential. Since the aircraft industry depends upon gains in production based on economies of scale, long term national investment and political support is required.

Fourth, the aircraft industry is essential for national defense. As one can see from history, military needs make up a major part of the overall demand for aircraft. As the nation’s air force becomes the principal axis of military power, the aircraft industry develops into the backbone of the military industry. Eventually benefits from leading military technology will spill over into civil industries.

One of the reasons that developed countries support aircraft industry is to strengthen their defense capabilities and maintain their position in international society. They have developed their aircraft industries to extend their influence in the world rather than on the basis of the market laws of supply and demand. This policy will not be changed in near future. It is now well known that achieving a self-defense capability is not possible without an independent aircraft development capability. Developed countries have long considered promoting an aircraft industry as a basic strategy for national prosperity.

From an industrial policy perspective, promoting defense industries have had benefits for civil industry. For instance, the countries that planned to establish highly technical industrial structure and strengthen defense capability through the aircraft industry have al-
ready obtained beneficial results. Technologies developed through military aircraft development have had spillovers into the civil industries and have increased their national competitiveness. Israel, Taiwan, Japan, and China belong to this category. Unfortunately, in the case of Korea, though government support resulted in 80 percent of the total domestic market being composed of military demand, spillover effects on the civil industry and improvement of national competitiveness have not been as great as expected.

STATUS AND CONCERNS IN THE KOREAN AIRCRAFT INDUSTRY

Status of the Global Aircraft Industry

After the global aircraft industry passed a peak of prosperity in the 1980s, international competition became more intense. The competition became fierce and consolidation of aircraft companies was accelerated due to the reduction of military demand after the Cold War and a stagnation of civil aircraft demand was caused by the worldwide recession.

In spite of the reduction in demand for military aircraft, the leading industries invested in new aircraft development utilizing cutting-edge technologies, while consolidating competing companies to increase their capacity for survival. On the other hand, as a result of widespread promotion of the aircraft industry as a national policy in the countries of Southeast Asia and Latin America, more than 30 countries can now develop aircraft independently.

As the market decreases and competition increases in both the military and civil aircraft industries, aircraft industries around the world are exerting a great effort in increasing intrinsic and extrinsic competitiveness for survival. As a part of this effort, the leading aircraft companies are merging and strategically cooperating with each other. Cooperation is now occurring horizontally between developed countries as well as vertically between developed and less-developed countries. To reduce development costs and risks related to market uncertainty, the leading aircraft companies are consolidating in their own countries and have engaged in cooperation for codevelopment and coproduction with leading companies in other countries. The main reason behind this cooperation is the economic gain made by
avoiding duplicate investment and sharing the risk for development and production. By vertical cooperation, companies can take advantage of low-cost labor by moving manufacturing of simple components to less-developed countries.

Evolution of the Domestic Aircraft Industries and Achievement Through Major Programs

The South Korean aircraft industry started with the acquisition of facilities and equipment for depot-level maintenance of military aircraft in the 1950s. In the 1960s, efforts were focused on incremental improvement of depot level maintenance capability. In the middle of the 1970s, the 500MD helicopter was produced under license for the first time in Korea and F-5E/Fs were produced under license in the early 1980s. Since then, however, there was no definite government policy promoting the aircraft industry and a failure to create a new R&D program for military aircraft for a long while, leaving the existing production facilities useless. The government established a law for the promotion of aircraft industry in 1978. But this law only provided a basis for governmental support to the weak domestic aircraft industry without any meaningful contribution to the purposed promotion of the industry. In 1987, another law for promotion of the aerospace industry was established to support research and development activities. This again failed to initiate any distinguishing research and development program for several years.

Late in the 1980s, the government initiated the Korean Fighter Program (KFP), the largest defense program ever in Korea, for the dual purposes of strengthening the air force through acquisition of a main fighter aircraft and boosting the domestic aircraft industry. Although it was far more expensive (about ₩1 billion), the program was purposely structured for production of the F-16 aircraft under license in Korea rather than direct purchase of a complete aircraft from the original manufacturer. It was expected to provide an opportunity for constructing the basis of an aircraft industry and acquiring technologies for development and production. This was a monumental investment considering that the total production of the domestic aircraft industry was only about ₩200 million at that time. Although we were able to expand production capability through the KFP, other results were not as great as expected, such as in obtaining
core technologies in terms of fighter aircraft research and development.

From the early 1990s, Korea was able to begin development of aircraft such as the Chang-Kong 91 and KTX-1 independently. The KTX-1 program has been conducted successfully, thanks to production experience gained through the UH-60 helicopter program and KF-16 licensed production and the accumulation of research in governmental research agencies. When the KTX-1 program started, some people claimed that it was not wise to invest in developing a trainer aircraft and that buying them directly would be more economical. It is lucky for us that the government had the will to engage in independent research and development. Considering the exclusiveness of development technology in the global aircraft industry, independent aircraft development capability is quite essential for future expansion of our aircraft industry.

We have found, through the development of the KTX-1, that we could develop aircraft for our air force, for which we had to rely on purchases from developed countries before. This has increased not only our self-defense capability and aircraft industry capacity but also confidence in design and development of more advanced aircraft in Korea.

**Concerns Within the Domestic Aircraft Industry**

As described above, the aircraft industry has certain demerits of requiring huge investment, long periods of time for development, uncertainty in profitability, and reliance on government for much of the demand. However, considering the widespread spillover effects of the aircraft industry over other related areas, investment as well as direct and indirect support by the government are inevitable.

Government policy to support and regulate the aircraft industry seems to go against the prevailing global trend toward free competition and efficiency. However, while the theory of free competition and efficiency is an appropriate tool for expanding market share in advanced countries, it is not a fair framework to apply to a country where the aircraft industry is still in its nascent stage.
Concerns within our domestic aircraft industry can be summarized as follows:

- First, there are limitations in the domestic market. During the initial stages of development, aircraft industry grows based on the domestic market. Since the existing system of ground transportation offers sufficient coverage over the small landmass of Korea, there is no inherent need for air transport. Thus, domestic demand of aircraft, if any, was limited and developing civilian aircraft to produce only a few aircraft was not considered economical.

- Second, the structure of the aircraft industry compared to other domestic industries is relatively weak in terms of production base, capacity, and growth potential. Although there are many aircraft companies in Korea, they are all small in size and none has the capacity for research and development. In contrast, other countries have only one or two aircraft companies, with only minor exceptions in a few advanced countries. Consolidation of the companies to pursue economies of scale is a trend among the aircraft industries of the world. Contrary to the overall growth of our industries, which was as high as 26 percent in the last ten years, the trade deficit attributable to aircraft has been growing continuously and has become the largest trade deficit item.

- Third, a severe lack of research and development capability has limited our aircraft industry to production of labor-intensive, low-value-added components through subcontracts with major foreign aircraft companies. Most investment has focused on simple component production accompanied by meager research and development for systems and subsystems. It is time to have an interest in training specialists in engineering and investing in research and development of aircraft for use in Korea rather than purchasing them directly from abroad.

LEVEL OF R&D AND PROSPECTS FOR THE DOMESTIC AIRCRAFT INDUSTRY

The representative industries of the Korean economy were the textile industry in the 1970s, the shipbuilding and construction industries in the 1980s, and the automobile and electronic industries in the 1990s.
In the 21st century, the Korean economy will have to put more emphasis on developing high value-added industries as the new engine of growth. If the aircraft industry is systematically fostered along with related industries, such as the machine industry and electronics industry, this will make a significant contribution to Korea’s progression to the level of advanced countries in the near future. Various other manufacturing industries will become in turn more advanced by taking advantage of technologies derived from the aircraft sectors. For instance, these technologies will be extended to fields such as high precision manufacturing industries, high-tech new materials industries, system and process management industries, and so on. There will also be great progress in the service industry, which is to expedite globalization and localization of skills following niche areas of specialization. Certain people feel that the aircraft industry will not meet the expectations of becoming an independent and sophisticated industry, especially in light of current adverse domestic circumstances. A pessimistic opinion is that the expected spillover effects or value-inducing effects from the development of the aircraft industry will be very limited in the case of Korea, as indicated by the past record. However, this is because of a significant deficiency in initiative and investment in the aircraft industry, especially in the area of R&D.

The approach Korea has taken for the promotion of the aircraft industry was to specialize companies in terms of aircraft types—that is, to have one company specializing in fixed-wing aircraft, another in rotorcraft, and the like. This approach certainly has had some good aspects but it was not so effective in the aspect of technology accumulation. The conservatism prevailing among the companies made technology transfer and mutual cooperation more difficult. Also, different measures worked at cross-purposes because of a lack of coherent policies. In retrospect, not having from the very beginning a more intense focus on a specific company in order to nurture it to a level of international competitiveness was regrettable.

Korea is currently suffering an economic recession due to the Asian financial crisis. In order to recover from this recession and eventually to have strong competitiveness in the future international circumstances, Korea is in strong need of rapid development of science and technology through cooperative efforts from every realm of industrial, academic, and research institutions as well as the government.
One theory popular in developmental economics has it that the least developed among the developing countries cannot help but depend on exotic technologies and must be permanently subordinate to the industrially advanced countries due to a lack of an indigenous capability for technology accumulation. At the same time, an industrially advanced country has a long lead on the least developed country, since the former preserves high-level or primary core technologies and invests intensively in research and development. The latter will always have only the low-level or secondary technology. This theory might overlook the fact that such subordination could be surmounted through application of transferred technology and state-led efforts toward home-grown technology. The limitations of the above theory are shown in the case of newly emerging industrial countries in Asia, which have achieved rapid economic growth in the 1980s. At the end of World War II, the Japanese aircraft industry was extinguished, but Japan has revitalized its industry since conclusion of a peace treaty in 1952 and resumed industrial aircraft production despite a prohibition on the production of military weapons. The Japanese constructed an independent capability for an indigenous fighter aircraft with sophisticated technology. This accomplishment was largely due to consistent policymaking as well as systematic and organized R&D. Japan’s policy to promote the development of fighter aircraft not only helped in terms of national self-defense but also contributed greatly to the development of its industrial structure and technological sophistication, particularly through spillovers into other industries.

After the United States placed a sales embargo on exports of its military fighter in 1965, Taiwan began to foster an aircraft industry with the dual purposes of accomplishing independent national defense capability and developing high technology through the promotion of the aircraft industry. Taiwan established the Aerospace Industry Development Center (AIDC), consisting of research and production facilities under the Ministry of National Defense. Taiwan also encouraged the growth of local companies to develop aeronautical weaponry. After a 30-year period, the total size of Taiwan’s aircraft industry is more than four times that of Korea and three times that of Brazil.

Although Indonesia lags behind Korea in terms of economic scale and infrastructural development, the Indonesian aircraft industry is
distinguished by its focus on the commuter airline sector, the result of a particular government-led focus in this area.

These countries all set out to develop their own aircraft industries at the same time but have grown into quite distinct national industries, reflecting geopolitical as well as economic diversity between these nations. Nevertheless, what unifies these cases was the common conviction that the aircraft industry was a way to enhance national prestige; that the industry is an integration of highly sophisticated and modern technologies; and ultimately that this would be beneficial for national development.

The scope of the Korean aircraft industry is estimated at less than 0.2 percent of total domestic gross product of the manufacturing sector. In recent years, this value has gradually increased but it is still low in comparison with other industries; and it is in marked contrast to the aircraft industry of the advanced countries, where the ratio of the aircraft industry to the entire manufacturing sector amounts to 30 percent. It is therefore obvious that the Korean aircraft industry falls far behind in comparison.

It is essential to bear in mind that an aircraft industry is vitally necessary for the continued development of high technology and graduation into the status of an advanced country. Through successive production of military aircraft such as the MD-500, the UH-60, and the KF-16, there has been a limited spread of technology to other areas of manufacturing as well as areas of research and development. Also, as a result of the substantial experience gained from these projects, Korea now has a renewed sense of confidence in approaching ever more sophisticated projects such as the development of KT-1, KTX-2, and other projects involving nonmilitary commuter aircraft. Korea also has been attaining, and expects to attain, a significant transfer of technology through these endeavors.

Still, there is domestic criticism stating that the country should not undertake so many projects at the same time. While recognizing the concerns underlying this view, it is necessary to bear in mind the scale of commitment necessary to develop an aircraft.

An aircraft industry is not built in a day, and, as a rule, the technologies involved cannot be delivered by one effort, but instead must be nurtured over several phases spanning a significant period of time.
Typically among developing countries, the sequence of phases in the development of the aircraft industry can be characterized as follows: (i) a depot-level maintenance phase; (ii) a subcontract production phase; (iii) a licensed component assembly phase; (iv) a licensed system production phase; (v) a parts localization phase; (vi) an international cooperative development phase; and last (vii) the independent development phase. The Korean aircraft industry is approaching the cooperative development phase or independent development phase, having bypassed the licensed system production phase and the parts localization phase. In terms of level of technology, the Korean aircraft industry is comparable to levels seen in India, Turkey, and Argentina; and experiences significant lags in comparison to Japan, Taiwan, Indonesia, China, Brazil, and others.

It has been difficult to find objective and reliable assessments of R&D and technology level within each of these countries. However, I would like to address some of these issues using what research has been done so far.

In speaking of Korean industry, depot-level maintenance techniques and manufacturing and assembling of the airframe have been singled out as nearly approaching levels of sophistication seen in the advanced countries. In addition, airframe design capability shows latent potential for advancement as do other areas of manufacturing techniques. At the same time, severe deficiencies have been pointed out in the areas of parts production technology, in specific areas such as surface treatment, heat treatment, and basic materials, all of which are closely tied to the local machine and machine tool industry. Also it is recognized that the level of know-how related to system integration design, as well as test and evaluation, is low. These are acute deficiencies in our efforts at aircraft development. There are also similar relative weakness in avionics and flight control due to insufficient local R&D in these areas.

**TASKS AND DIRECTIONS FOR THE DEVELOPMENT OF THE AIRCRAFT INDUSTRY**

As discussed above, there are many difficulties in fostering the aircraft industry. But despite the difficulties, we are confident that we can never abandon the aircraft industry. The development of the air-
Craft industry is an index measuring the level of sophistication of the general economy, and as is ultimately shown by the presence of advanced aircraft industries in most prosperous countries, this area simply cannot be neglected.

Since 1996, the Seoul Air Show has been held twice under the auspices of the ROK Air Force and many symposia have opened under the sponsorship of the Agency for Defense Development. By virtue of these events, a deep interest in the aircraft industry is on the uprise nowadays from all areas of industry, academia, the military, the government, and the people. Building on top of this interest, it is important to establish a long-term development plan regarding the aircraft industry. I would like to present my opinion on the general outline of such plan.

Close Coordination and Support of Government Organizations

Coordination between various government organizations, segments of industry, and academia related to the aircraft industry is crucial. In this area, government-sponsored research organizations should work closely with their counterparts in the private sector, bringing together expertise in R&D from the public sector and production processes from the private sector. Determinations of policy direction should be made after earnest discussions and, when taken, policies should be appropriately guided. It has always been the case that because of the diffuse nature of government organization, it is difficult to assess the efficacy of diffuse parts working in conjunction with each other. For instances, budgetary matters are under the Ministry of Finance and Economy, manufacturing is under the Ministry of Trade, Industry and Energy, military procurement under the Ministry of National Defense, commercial aircraft production under the Ministry of Construction & Transportation, and commercial aircraft R&D under the Ministry of Science and Technology. The simultaneous involvement of all of these elements increases the probability of unnecessary complexity and highlights the necessity of close cooperation between these government departments. Along with the high degree of investment called for in the development of the aircraft industry, this diffuse involvement by the government can
also be an obstacle, hampering efficient allocation of limited capital and human resources.

**Promotion of International Cooperative Joint Development Efforts**

One difficulty with the effort to develop an independent aircraft capability has been the need to engage in extensive R&D at high costs and at the same time to rely on subsequent demand to offset these costs. Relying solely on domestic demand is not feasible since domestic demand will never be high enough to allow for production on a scope that would allow production to take advantage of economies of scale. Therefore, one imperative has been to engage in joint cooperative efforts both in R&D and in increasing demand. A recent tendency in the global aircraft industry has been the growth of civil-military dual use technology, reflecting the overall reduction of demand in the military sector. Mergers and acquisitions (M&A) or constructions of international cooperative consortia are being actively formed to share the burden of risks and to broaden the scope of target markets. Recognizing these aims, European countries embarked on this sort of endeavor over 30 years ago, and this model is now being emulated all over the world.

**Expanding Offset Programs for Buildup of R&D Capability**

Offset programs are a unique feature of foreign procurement practices and have been an effective means to obtain the transfer of technology from abroad. Korean research institutes as well as industry have benefitted significantly from these programs and have been able to gain wider access to advanced technologies through them. The Ministry of National Defense of the ROK has encouraged the use of offsets in purchase of foreign military equipment since 1983. For example, in the case of KF-16, the offsets related to the production of forward fuselage contributed to enhancing the manufacturing technologies. From an operations standpoint, purchasing technologically proven weapon systems is preferable to opting for domestic licensed production or complete domestic development. Though there are some negative aspects of offset policy, overall significant benefits are possible through this mechanism and better use of this will make
significant contributions to the domestic development of aircraft production capabilities.

Dual-Use Civil-Military Technologies

For a developing country such as Korea, with its limited economic, personnel, and facilities resources, the policy of expanding dual-use technologies which can be applied both in civil and military fields is of utmost importance. The focus of this policy is to “spin on” technologies already existing in the civil area to be transferred to and utilized in the military area and, at the same time, to “spin off” existing military technologies to be released to the civil area to the greatest extent possible. For unavailable technologies in both areas, cooperative efforts to develop them are desirably undertaken, which is to “spin up” the technology. By pursuing this, maximum achievement with low cost can be expected. Dual-use technology promises benefits in all sectors, but it is in the aircraft industry where the benefits are most promising due to its attribute of strong spillover effect to other areas.

Dual-use technology has been touted as the lifesaver for the defense industry as a whole, particularly since the global reductions in demand caused by shrinking defense budgets and the end of the Cold War. The United States has maintained a policy of encouraging spin-offs and commercialization of technologies related to defense, energy, and space into the civil sector. The U.S. Department of Defense is currently executing a plan to revise military specifications with the intent of broadening access to economically more beneficial industrial bases. The plan promotes greater use of performance-based specifications and commercial-type specifications and standards.

Authorizing Capability for Quality and Airworthiness Certification

As Korea aims at becoming one of the leading aircraft countries in the coming decade, it must establish a quality authorization system and engage in the international Bilateral Aviation Safety Agreements (BASA), which is required for type certification, production certification, and airworthiness certification for aircraft it develops. This is
important both because aircraft have to provide a measure of assurance regarding safety and reliability, and because authorization for the import and export of such aircraft requires such a government-level agreement. In the leading countries, the cost expended for quality assurance reaches as high as 15 percent of the total development cost. The entry into BASA usually takes so many years that government support for early preparation of the necessary policies is essential.

**Role of the Air Force in the Growth of the Aircraft Industry**

The domestic aircraft industry of Korea has been developed by the military rather than civilian sector. Beginning with depot maintenance and licensed production of military aircraft, the recent development of primary (KTX-1) and advanced (KTX-2) training aircraft for the ROK Air Force constitutes the primary source of our aeronautical technology advances. In this sense, the ROKAF may be said to have played a leading role in the development of the national aircraft industry, and such a role will not change in the future. If anything, the role of the Air Force will be even more prominent in the future due to the ever-increasing importance of high technology and air power in the evolving nature of warfare.

Alvin Toffler, a science futurist, anticipated in his book, *War and Anti-War*, that war in the 21st century would feature information warfare driven by rapidly evolving science and technology. The features of the future war have already been emerging through the Gulf War and the latest Yugoslavian conflict, which have been referred to as “clean wars.” Due to highly advanced aeronautical and electronic technologies, the two wars have distinctly demonstrated that an independent operation of air power alone may be the thrust of future conflicts. This is breaking up the old notion that air power is a means of supporting the ground forces and that war can be terminated only by successful ground operations. Air power can now be used as a key instrument of war suppression in peacetime, as well as a political means of submission in a conflict situation. In wartime, air power will become the primary instrument of damaging enemy strategic sites. For this reason, many countries around the world nowadays are concentrating their effort more on reinforcement of air power, while providing strong support to R&D of new weapons systems.
Korea cannot afford to be unprepared for the high-tech warfare of the future. Yet it is becoming more difficult to obtain more advanced technologies at a time when technology protection regimes are being strengthened and countries are placing stricter controls on export licenses and the flow of strategic weapons. In addition, inadequate R&D and a shallow domestic production base pose even more difficulties in maintaining technological preparedness. At the present time, Korea is subject to rigid controls on technology transfer from the United States in the form of the Missile Technology Control Regime (MTCR), the Critical Technology Plans (CTP), the International Traffic of Arms Regulation (ITAR), and others. In light of these controls, and also of the need to maintain an adequate level of technology for national defense, it is imperative for Korea to develop independent R&D capabilities. Though R&D requires significant risk and investment in terms of financial and other resources, this is a much more feasible path than continuing to rely on technology borrowing. By simply acquiring advanced weapon systems from abroad, we would only be meeting immediate needs of building up our military resources but constantly deepening our dependency on outside sources for technology. Although direct importation of weapon systems does have some advantages, such as in proven capability and joint operation with friendly countries, this situation would only work to exacerbate our dependency on borrowing from abroad for weapons operation and development.

This growing dependence on foreign suppliers also worsens our ability to negotiate when acquiring subsequent weapons from abroad, since a deepening dependency will, over time, restrict the number of viable suppliers. This in turn tends to negate the benefit of acquiring at the lowest cost, which was originally one of the benefits of direct acquisitions from abroad. In emergency situations, reliance on direct imports also poses a serious threat since availability of demanded weapons or support equipment might be jeopardized. Weapons exports are often severely restricted or banned in cases of conflict or when such exports are made to conflicting countries. Over the long run, an air force relying on direct imports of state-of-the-art weapon systems without an independent R&D capability can not be regarded in fact as a reliable or stable arm of national defense.

Within the total military budget for the Republic of Korea, a mere 3 percent is allocated to R&D investment. This investment is quite low
compared to levels seen in advanced countries, not only in percentage but also in absolute terms. Due to the current economic climate, it is be difficult to expect any near term increase in defense spending. Nevertheless, a long-term policy regarding the development of defense technology is necessary. Aside from budgetary increases, other elements of such a long-term policy would include diversification of sources of import, active pursuit of international cooperative development, and continued emphasis on dual use military-civilian technologies. On a fundamental level, the bedrock of defense procurement policy should be a stable approach toward R&D.

CONCLUSION

In conclusion, to revitalize research and development on the aircraft industry of Korea, the following political considerations must be recognized:

• First, there must be renewed recognition of the noneconomic aspects of the aircraft industry. It is necessary to approach the promotion of the aircraft industry not just with a view of economic value but also recognizing the national security dimension. If only the economic value and investment were considered, governmental direct action would not be immediately required.

• Second, it is necessary to recognize that the aircraft industry has certain beneficial externalities such as enhancing national prestige. Thus an overall evaluation of the industry cannot be limited to a quantitative judgment alone. Competition in the aircraft industry during the coming 21st century is expected to be fierce, and questions will abound with respect to returns on investment and the assumption of substantial risks.

• Third, promotion of the aircraft industry should be undertaken in close connection with other industrial activities, while government support should follow the promotion of the aircraft industry with a view to attaining fundamental capabilities for the aircraft development. As mentioned before, the aircraft industry should be promoted within the framework of a fully supported national aim to nurture a strategic industry. It is still too early to
say that the aircraft industry is mature. Government policy and continued substantial investment is still necessary to advance development.

• Fourth, the full support of the Republic of Korea Air Force is necessary since it continues to play an important role in the growth of the aircraft industry and in particular makes contributions in research and development. Since the successful growth of the Korean aircraft industry still depends mainly on demand from military aircraft development, the need of the ROKAF in terms of new projects and meeting new threats will translate into a continued need for R&D as well as product demand. Ultimately, R&D and meeting these demands will translate into greater power for the ROKAF. In order for this cooperative effort to take place, the ROKAF must provide a coherent plan that both addresses the needs of the present domestic aircraft industry and meets potential threats to the nation’s security.

• Fifth, continued stable demand both in the short and long term are necessary to promote long-term accumulation of technology and to foster investment in basic R&D. If we fail to pay attention to technology accumulation on the grounds that demand by the ROKAF alone does not justify such long-term investment, we will nullify all of the gains made thus far. Though the scale of its demands may not be large, the ROKAF has made significant advances by demanding sophisticated high-tech weaponry, and will continue to do so in the future.

• Finally, air-based weapon systems are an important core military component in a modern war. The aircraft industry is going to be an important basis of that system, while simultaneously playing a role as a high-value-added and technology-intensive industry. Korea recently became an OECD member country. But the Korean aircraft industry is still technically inferior compared to an industrially advanced country because we have neglected investment in that area for the last 30 years. Presently, it is urgent to invest in research and development in order to stand on a more equal footing with our fellow OECD member countries. Investment in research and development is investment in the future. Demand for research and development cannot be met if our focus is limited to immediate short-term interests, nor can
we achieve long-term expansion if we lack a national focus on clear objectives. It is my earnest hope that we have learned from our mistakes in the past 30 years and that now we will take adequate measures to prepare for the coming century.