



BONN INTERNATIONAL CENTER FOR CONVERSION

B · I · C · C

BONN INTERNATIONAL CENTER FOR CONVERSION • INTERNATIONALES KONVERSIONSZENTRUM BONN

paper 16

Typology of Military Assets

april 00

TYPOLGY OF MILITARY ASSETS

by Michael Brzoska, Patrice Franko and Jo Husbands

Table of Contents

Executive Summary	5
<i>The framework of this report</i>	5
<i>Military sectors as economic entities</i>	5
<i>Criteria for a typology of military assets</i>	5
<i>Human resources: Demobilization and reintegration of ex-combatants</i>	6
<i>Military land</i>	6
<i>Military production facilities</i>	6
<i>Civilian business operations of the armed forces</i>	7
<i>Military Equipment</i>	7
<i>Military income sources</i>	8
<i>Post-conflict asset transformation: additional considerations</i>	8
Introduction	10
Military sectors as economic entities	12
<i>Definitions and functions of armed forces</i>	13
<i>Armed forces and military sectors</i>	14
<i>Military input, output, and assets</i>	15
Conflict and military sectors	16
Criteria for a typology of military assets	17
<i>Categories of military assets</i>	18

<i>Specificity of use and users</i>	18
<i>Conditions of assets and personnel</i>	18
<i>Reuse potential and challenge</i>	19
Military assets: categories and potential	19
<i>Human resources and capital</i>	19
Former soldiers and ex-combatants from a human resource perspective	19
Data sources	20
<i>Demobilization and reintegration issues</i>	22
Demobilization factors	22
Reintegration challenges	23
Outside support	24
<i>Demobilization and reintegration success</i>	25
Military land	25
<i>Types of military land</i>	26
<i>Data on military land use</i>	27
<i>Reuse and redevelopment opportunities and challenges</i>	28
Potential obstacles	28
Investments	30
Valuation	30
Reuse and redevelopment	30
<i>Examples of successful base conversion and development</i>	31
Military production/service facilities	33
<i>Types of facilities</i>	33
<i>Sources of Information</i>	35
<i>Civilian reuse potential of producers of military goods</i>	36
Military specificity	36

Factors shaping reuse	37
Conversion of production factors	38
Privatization	38
<i>Examples of civilian reuse</i>	40
Armed forces' business operations in civilian markets	40
<i>Military business</i>	40
<i>Sources of information</i>	44
<i>Asset transformation issues</i>	44
Military equipment	44
<i>Types of weapons and ammunition</i>	45
<i>Other military equipment</i>	45
<i>Data on military equipment</i>	46
<i>Productive reuse potential of military equipment</i>	46
<i>Selected examples of reuse, scrapping, and elimination</i>	47
Income to finance military operations	52
<i>Sources of funds/entitlements</i>	52
Defense budgets	52
Other government funds	53
Other institutionalized sources of funds	54
External funds/military aid	54
Income from military-run business/pension funds	54
<i>Sources of information</i>	55
<i>Scope of a "peace dividend"</i>	56
Conceptual considerations	56
Impediments to alternative resource use	57
Empirical evidence	58

Efficiency savings	58
Post-conflict asset transformation	59
<i>Asset revaluation</i>	59
<i>Ownership issues</i>	60
Civilian/military asset ownership problems	60
<i>Decision-making over post-conflict asset transformation</i>	61
<i>Privatization</i>	62
Security sector reform	62
<i>Reorganization of security sectors</i>	62
<i>Asset and human resource reuse in security sector reform</i>	63
Political economy of military asset transformation	63
<i>Interests and actors</i>	63
<i>Sequencing</i>	64
<i>Assets and liabilities</i>	64
Summarizing possibilities and problems of military asset transformation	65
Table 2: Typology of military assets	68
References	70

Executive Summary

The framework of this report

This report suggests a framework for a country interested in assessing the scope of its military assets that have potential for transformation into peaceful, productive purposes as part of a post-conflict or structural adjustment package. This report draws no conclusions as to an optimal level of defense assets. Rather, once a political and strategic decision is made by a country to realign its military sector, this framework shows how successful management of the transformation of military assets may contribute to economic development and sustainable peace.

A military asset is defined broadly to include the stock of physical goods, land, human and financial resources controlled by the armed forces.

Military sectors as economic entities

The opportunities and challenges of reducing the costs of armed forces and freeing resources for reconstruction and social development are at the core of this report. Military sectors draw on inputs of finance, personnel, industrial expertise, equipment, land, and infrastructure to produce the output called defense.

During conflict military asset accumulation may be unsustainably high and somewhat haphazard.

Under post-conflict conditions or with constraints imposed by economic adjustment, reallocation of resources from the military to the civilian sector might be considered in the national interest.

The armed forces, together with the ancillary organizations that support their efforts are called military sectors. Major elements include civilian command, control, and administrative structures: defense ministries, private and state production facilities for weapons and ammunition, research institutions, civilian logistics operations and training facilities to support the armed forces, and business operations such as airports and duty free shops run by armed forces in civilian markets.

Criteria for a typology of military assets

The *fungibility* of assets, or the degree to which they can move from the military to the civilian sector is a key criteria for evaluating reuse potential. *Physical conditions* of assets, including age and degree of usage, influence reuse potential. In many cases, *investment* is critical prior to reuse. For example, land must be cleared of mines, and combatants re-educated for civilian employment.

Human resources: Demobilization and reintegration of ex-combatants

Releasing labor from the armed forces may promote civilian development, particularly where training has improved the skill level. Post-conflict societies may, however, have difficulty in absorbing additional labor.

Demobilization of ex-combatants must take health and handicaps, level of training, demand for skills, length of service, and personal motivation into account. International data on active duty personnel strengths and recent experience with demobilization is fairly accessible. Flexible coordinated outside assistance for resettlement and training is crucial to success. A wide range of instruments, including counseling, technical and managerial training, provision of tools and inputs, credit facilities, housing programs, social infrastructure, health, and short-term bridge employment should be considered as part of a well-planned process. Special consideration should be given to the needs of child soldiers, female ex-combatants, and the children and spouses of former combatants.

Military land

Military land includes training areas, airfields and airports, naval ports, logistics facilities, barracks, command and control facilities, testing grounds, education facilities, service centers, and environmental and geological observation stations.

In assessing the reuse potential of land, environmental contamination, condition of superstructures and the degree of specificity of use of structures must be taken into account.

Systematic international data on military land holdings is unavailable; national governments are the best, albeit sometimes unreliable, source of information on military land use.

Major reuse challenges include proper apportionment of institutional responsibilities, environmental clean-up costs, the diversity of facilities with differential reuse potential on a single base, and control over the process of transfer to prevent asset stripping and squatter settlements.

Investments must often be made to upgrade the condition of facilities prior to resale. A high valuation depends on pre-sale repairs, modernization, and environmental cleanup as well as the local real-estate market. Timing is crucial; damaged and depressed post-conflict economies may not support healthy asset sales in the short run. Public-private partnerships to develop facilities but share environmental and clean-up risks have facilitated base closure and regional development.

Military production facilities

Military production facilities include military arsenals run by the armed forces, government facilities for technology (usually run by defense ministries), government owned,

privately managed facilities, state owned, privately registered companies, and fully private arms producers. These produce military systems and their components, but also relevant basic products (steel, aluminum, etc.) and dual-use goods. Together with research and service facilities they comprise the defense industrial base. Depending on the degree of privatization, data on production facilities may be limited, even on the part of the government.

The structural adjustment of military production facilities must take into account the barriers in moving from military to civilian production, including secrecy requirements that require compartmentalization of work, detailed project accounting, performance orientation targets to small scale production, cost negligence, and unfamiliarity with marketing in non-government markets.

Defense industry culture, including an organizational structure that favors research and development over marketing, highly task-specific research skills, exacting and expensive levels of quality control, and a government-oriented production mentality must be transformed for effective conversion. The degree to which defense producers were operating in dual use technology environments, their exposure to civilian marketing, the capacity for long term civilian business planning, the ability to reduce overhead, the availability of risk capital, and the degree of outside assistance condition the probability of successful conversion. Privatization of facilities is generally the best option for conversion; at that point the general economic environment is crucial in shaping success.

Civilian business operations of the armed forces

Armed forces operating businesses in civilian markets sustain military operations in several countries, including Indonesia, Turkey and Ecuador. Extra-legal activities, such as logging in Cambodia or Thailand and narco-trafficking, may support official programs or personal gain. A low degree of transparency makes data on military businesses scarce. Pension and insurance companies, strategic industries, transportation, construction, and logistic services including air and road transport often enjoy political advantages over private commercial concerns.

Privatization of military businesses promotes transparency, and reduces the likelihood for corruption or embezzlement. Changing access to these assets, may, however, challenge a delicate balance of power within the military and between the military and civil society. Carefully planned compensation and assurance of more transparent and accountable sources of funds may serve to secure the institutional interests of the military.

Military Equipment

Military equipment is generally highly user-specific, with limited post-conflict reuse potential. Heavy conventional weapons, light weapons, and ammunition are more often

candidates for disposal than reuse. Other military equipment such as computers, earth-moving and construction vehicles, radar, radio, transport aircraft and trucks, and other land and sea vehicles hold greater reuse potential. Scrap value of heavy equipment is low, with the exception of ships. Data on heavy weapons is quite good; the information base on light weapons is improving but still sparse and there is no comprehensive international data on other types of military equipment.

Light weapons are a source of violence and insecurity, circulating from one conflict to the next. Safe storage or elimination of light weapons has become an urgent matter to decrease crime and support internal security measures. Clearance of landmines has become a precondition for agricultural development, although the process is slow and expensive.

Military income sources

Income to finance military operations derives from defense budgets, other government funds such as special accounts, institutionalized sources of funds such as the sale of natural resources, and external funds or military aid.

Good governance practices for fiscal transparency include principles of clarity of roles and responsibilities in defense budgets, public availability of complete and detailed information, open budget preparation, execution and reporting, as well as independent assurances of integrity and accountability to promote efficient use of military resources.

Data on military expenditures is unreliable; national data must be scrutinized for what it does and does not contain. Off-budget income sources and the placement of pension funds are two critical divergences.

The “peace dividend” from post-conflict downsizing often may be smaller than anticipated. Conceptual and measurement problems plague estimates. Impediments to alternative resource use include general economic collapse following transition, the drying up of external sources of funds including foreign aid and expatriate contributions, and the fact that disarmament itself may generate additional costs of disposal, destruction, and environmental cleanup.

Post-conflict asset transformation: additional considerations

Asset revaluation needs to occur prior to transformation. Asset value after transformation is a function of the civilian usability or fungibility of entitlements, the physical status of assets (including environmental dimensions), the civilian demand for transformed assets based upon consumer preferences and general level of economic activity, the investment cost of asset transformation, and the degree of asset degradation either in the short term due to asset stripping or over time through disuse.

Ownership issues can plague transformation. Ambiguities in lines of decision-making between civilian and military authorities and among the different branches of the armed services complicate transformations. Various levels of government (local,

state, and national) may lay competing claims on assets. Interests of local authorities in maximizing jobs may conflict with national bureaucracies interests in fiscal adjustment to optimize immediate income.

To promote respectful and cordial civil-military relations, the military might require compensation for the sale of assets; the military may also be held accountable for investments prior to sale including disposal and environmental clean-up and might look for compensation for such outlays.

Central military institutions versus regional units may dispute claims on military assets; private individuals within the armed forces who have enjoyed certain perquisites of service may resist reallocation and loss of control.

Foreign ownership of military assets presents practical problems of responsibility for clean-up that might affect the residual value of bases.

Ambiguities in decision-making authority arise at the level of planning and implementation, financing, and allocation of benefits. Planning might fall under national/institutional lines of authority while regional development agencies are tasked with final use problems. The interests of external donors in facilitating transformation may also conflict with local, state, and national concerns. Careful coordination and consideration of layered levels of interests is critical to success.

Transformation of military assets in post-conflict situations requires a simultaneous revision of national security objectives and reform of instruments to ensure external and internal security. This complicated process of *security sector reform* can be facilitated by external funding to engage civilians and military in a careful and constructive dialogue on security concerns. Issues for consideration in the reorganization of security sectors include the strengthening of systems of military accountability to civilian decision-making; a re-orientation of military doctrines toward peace, arms control, and regional security; the democratization of the armed forces; and the separation of police functions to maintain internal order from responsibilities for external defense and international security concerns.

Military asset transformation is intimately linked with the *political and economic fabric* in a given country. It must take into account the difficult reconciliation of the political and institutional interests of the military with the goals of civil society. Downsizing of the military does not necessarily mean a denigration of military capability; military reform should instead promote a better and more transparent match between objectives and instruments to achieve a stable and sustainable peace. If downsizing is accompanied by a modernization and professionalization of the military to meet new strategic goals of resource surveillance and patrol, for example, the military may perceive the win-win nature of a reallocation of defense assets from outdated strategic scenarios to new national priorities.

Sequencing of the release of assets must take into account local political and social needs. The immediate release of ex-combatants, for example, might be postponed through road construction projects if local labor markets are not yet ready to absorb a large influx of job aspirants.

The political rationale for demobilization and destruction of military equipment may indeed outweigh the economic imperative. An estimate of the costs and benefits of

demobilization should include the estimated costs of political and social violence that excess and uncontrolled weaponry perpetuates. Environmental considerations of cleanup of land mines or other facilities may tip the scale over the immediate economic returns. Governments may need to invest today in defense asset restructuring to reap economic benefits in the future.

Introduction

This report introduces a framework for assessing the scope of military assets for a country considering the transformation of its defense sector at the end of conflict or for fiscal adjustments. It provides information relevant for the World Bank's work in transitioning post-conflict countries, as well as in countries undergoing substantial downsizing of their armed forces, broadly defined. The ultimate goal is to assist the World Bank, and other actors involved in post-conflict work, in maximizing the positive contributions and minimizing the negative effects of excess military assets to sustain peace and promote economic growth.

The World Bank and the IMF, in particular, give significant attention to the size of a country's military expenditures, but until recently they have not examined their content nor other issues related to the defense sector. A number of recent trends within the Bank's activities have nonetheless led to greater attention to defense sector questions. The enormous barriers facing countries emerging from conflict in their efforts to get back on the path toward sustainable development, which led to the creation of the Post-Conflict Unit, have made it difficult for the Bank to ignore at least some security-related issues, such as the demobilization and reintegration of former combatants. Perhaps most important, the Bank's increasing focus on governance brought acknowledgement of the defense sector as another possible subject for public sector reform (World Bank, World Development Report, 1997). One reason for undertaking the creation of a typology of military assets is thus to assist in thinking about the security sector as one would about other sectors that might be the subject of World Bank activity. The analogy is certainly not exact, but this report explores how much might be done to create such an analytical framework.

Attention to the defense sector is a sensitive issue within the Bank because of concerns about overstepping the Bank's mandate (see e.g. World Bank, 1998, p. 23). Questions regarding what activities are appropriate within the mandate are outside the scope of this report. The authors of this report attempt systematic and comprehensive coverage of assets and similar resources in military sectors in order to present the full menu of possibilities. Choices would have to be made by taking into account organizational mandates, along with the policies and practical situations of individual countries.

The authors believe that the post-conflict transformation of military sectors can have profound influence on the stability of economic, societal, and security conditions for reconstruction, depending on the scale of military activities during the war in relation to peacetime levels. Transformation is often costly, but when managed

successfully can contribute to a sustainable peace, as well as economic and social development. Transformation of assets to non-military use can take numerous forms, the most promising being commercialization and privatization. Past experience with post-conflict transformations of military sectors generated a wide array of examples and lessons, which provide a useful contribution towards future improvement of transformation strategies. As an inception study on transforming military assets, this report cannot do full justice to the wide spectrum of past experience. It does, however, provide a preliminary analysis of the large body of relevant literature and pertinent work at the institutions responsible for this report. It also includes comments collected in a series of interviews at the World Bank. A broader study could build upon this work on the basis of in-depth country analysis.

This report focuses on the technical and economic aspects of defense asset transformation. It does not discuss how likely, beneficial, or detrimental it would be for a certain country to keep, increase, or release assets within the military domain. What is presented here is not a security assessment, but an economic one. In this report it is assumed that a prior decision has been made by the relevant national authorities to release military assets. The topic is the management of these assets for sustainable peace and development, not the rationale behind releasing assets. However, an asset typology can provide an important base to make these political and strategic decisions. After states have undertaken these decisions, the management of the transformation of the assets can begin. It should be underscored that any assessment of the possible size of military asset releases is in no way indicative of an optimal asset release in terms of security. Analysis of available assets and lessons of conversion and downsizing elsewhere may, however, help guide policymakers towards optimizing productive uses of national assets.

The questions asked in this report include:

- What are military assets?
- What types of military assets can be distinguished?
- How fungible are these assets for non-military use?
- How does the management of military assets affect post-conflict reconstruction efforts?
- To what extent can military assets be put to productive use in post-conflict situations, and to what extent are they an obstacle to post-conflict development?

The term *asset* is used in this report in a broad sense, and is not limited to the categories of standard accounting practice. Rather, in addition to the stock of physical goods and funds owned by armed forces, it is also used to cover human resources, land, buildings, technological facilities and financial incomes of armed forces and related entities.

The first section of this appendix supplies the conceptual foundation for a broad typology of military assets by looking at military sectors as resource transforming, economic operations. In the second section, criteria for a typology of military assets are discussed; it is followed in the third section by the detailed typology. This exercise is presented as a prototypical assessment of military sectors. The third section also presents possible international sources of information on the various military assets that might be helpful in making assessments of the availability of military assets, which sharply differ from case to case. Not all armed forces hold a complete range of assets presented. The section also contains some discussion of the particular difficulties and prospects of military asset transformation by type of asset. The fourth section discusses problems specific to the revaluation of military assets after the end of conflicts, or in times of rapid military downsizing. What formerly were assets can become liabilities. Other assets may have to be reconfigured or reconstructed to be of continuing value. New investment may be necessary to reap benefits from asset transformation. A sufficient level of security forces will be necessary for sustainable peace and economic growth. This leads to the related issue of security sector reform, with a view to optimal asset exploitation and resource use in the restructured armed forces. Some relevant experiences and lessons are brought into a mostly conceptual discussion in this section. In sum, this project is intended to define the scope of military assets and underscore their productive potential in post-conflict situations.

Military sectors as economic entities

This study concentrates on the economic aspects of re-using military assets for sustainable development upon the cessation of open hostilities or during a period of rapid military sector restructuring. Obviously, post-conflict situations are almost synonymous with political and social crisis, which strongly influence both in-country policy-making and the conditions of outside assistance (World Bank, 1998; OECD, 1998). However, such political questions are outside of the thrust of this report. Our focus is on maximizing benefits and minimizing costs of reform after the political and strategic decision to downsize the military is made (BICC, 1996).

Military forces built up before and during conflicts are generally over-sized and often not properly configured for peacetime purposes, so that post-conflict the political will for downsizing is widespread. This political will is often reinforced by economic considerations, including the wish to reduce the costs of armed forces and free resources for reconstruction and economic and social development. The opportunities and challenges of such reductions and the reuse of resources are at the core of this report. Thus, the report is limited to looking at just one of the many issues of post-conflict reconstruction (see World Bank, 1998; OECD, 1998), the transformation of defense assets, and highlighting the economic side of that issue.

To better illustrate the economic approach, it may be helpful to think of the military as an entity producing an output by using resources, combining factors of production, or employing assets. However, there are some difficulties with this model.

One is defining and valuing the product "defense" or "security," while another stems from varying institutional arrangements in transforming inputs into outputs. Discussion of military-economic aspects is therefore sometimes limited to analysis of the inputs used by regular armed forces, but this view is too limited (Hartley and Sandler, 1995a). Armed forces are more than just a collection of inputs, even from a narrow economic point of view. They combine various resources to achieve the fulfillment of nationally determined functions and turn resources into assets which decision-makers view as optimal for achieving those functions. However, while return on equity, and similar indicators, provide obvious criteria for optimizing production elsewhere, the ambiguous nature of "security" as a public good of a specific nature makes calculations of social returns on inputs in military efforts highly problematic.

Definitions and functions of armed forces

In Western industrialized countries, the usage of terms such as "the military" or "the armed forces" is often limited to Army, Navy, Air Force, and the like: well-structured organizations tasked with providing national defense against external enemies. Holding monopoly control over large-scale tools of violence, these forces are capable of inflicting heavy physical damage. This narrow definition is linked to the specific military function developed in Western liberal societies since the 18th century. It assumes a strong separation of external defense from other functions, with strict control over the tools of violence by central governments and specialized organizations that exist independently of the military. But this definition cannot be assumed in many countries. Especially in conflict situations, terms such as "armed forces" and "the military" need a wider interpretation and the following should be taken into consideration.

- Regular armed forces often have the additional or even sole function of "regime security," of keeping a government in place, if necessary with violent means, against internal opposition. The difference between what are often called "police functions" in Western industrialized states, namely to maintain internal order, and the role of these forces becomes blurred (Ball, 1988). To combat internal enemies, armed forces may mount comprehensive nation-building activities. The goal of such civic action is to win the confidence of the people and establish the credibility of governments, most often in remote areas.
- Organizations with a government mandate to legitimately carry weapons and use them proliferate during periods of violence. These include non-professional, or half-professional organizations, such as militias, paramilitary groups, or official organizations which attain a role in the maintenance of internal order through violent means, such as border patrol forces, coast guards, customs, and well-armed police forces.

- The government monopoly over the use of organized violence is often punctured by opposition and guerilla forces, non-governmental organizations armed with weapons and the intent to use them to fight similarly equipped organizations.

If one broadens the conventional definition considerably, all groups of persons organized to use force against comparable groups and to carry weapons in order to fight others carrying weapons, could be called armed forces. This definition would not only include forces fighting over political goals, such as administrative control over a state territory; but armed bandits, whose only goal is private enrichment, along with private security guards charged with protecting property. For the purpose of this report the most useful definition includes only those groups of persons organized to use force against other groups to achieve political goals, such as control over territorial administration.

This discussion indicates that a comprehensive view of “the military” includes:

- Regular government forces, professional warfare specialists with heavy armaments: Army, Air Force, Navy, Marines or other special forces.
- Paramilitary governmental forces, semi-professional, with lighter armaments: militias, border patrol forces, coast guards, customs and well-armed police forces. (Note that the term "paramilitary" is a technical reference to these lightly armed forces and does not carry the pejorative association sometimes used in the popular press.)
- Opposition forces, often less well equipped than regular government forces but intent on using organized violent force for political goals: guerilla forces, liberation forces, etc.

The existence, type, and size of non-regular forces are determined by historic, as well as country-specific circumstances. Historically, there has been a process of monopolization of forces within countries: regional forces have been integrated into central ones, paramilitary forces and militias have been brought under a unified command and control system. In some countries, armed forces are commanded by different authorities for functional reasons. Some historical differences continue to have importance. The British security-institution system, for instance, lacks well-armed paramilitary forces, such as the French Gendarmerie and the Spanish Guardia Civil. In some countries, rather than reflecting different functions, a bifurcated force structure is deliberately maintained as a power balancing mechanism, with one type of armed forces coming under the Ministry of Defense and another under the Ministry of the Interior.

Armed forces and military sectors

Some armed forces have historically tried to be self-contained organizations, providing themselves with their own food and producing the necessary weapons, uniforms, and

equipment in military establishments. Opposition forces often come close to this model of self-sufficiency. More modern armies rely on specialization; they operate with ancillary organizations around them to provide administration, logistics, weapons, etc. The concept of armed forces as a hub of a larger set of organizations to support their operations is captured in the term “military sector.” The military sector consists of all those organizations that allow the armed forces to fulfill their functions. The size of such organizations varies; they generally grow with the acceptance, in the armed forces and by those making decisions about armed forces, that a division of labor promotes efficiency. Armed forces may continue to perform operations in-house, even where inefficient, because of considerations of security, or to maintain exclusive control over such operations.

Major elements of military sectors, in addition to the armed forces themselves, include:

- Civilian command, control and administrative structures, such as defense ministries.
- Production facilities for weapons, ammunition and other military-type goods, whether under non-military government ownership or under private ownership. These facilities may also be operated as joint ventures with international defense producers.
- Military research and development institutions.
- Civilian logistics operations for the supply of armed forces.
- Civilian training facilities for exclusive, or predominant, use by armed forces.
- Business operations run by armed forces but operating in civilian markets. These may include official business activities such as airports and duty free shops. They should be distinguished from extra-legal activities sometimes undertaken by individuals within the armed forces, such as smuggling or commodities stockpiling, which do not add to the official assets of the armed forces.

Military input, output, and assets

Military sectors, with armed forces as their core, need various inputs to perform their assigned functions. These inputs are supplied by, or taken from, the society at large. Resources available to a society, and its economy, are drawn in as inputs to military sectors. Figure 1 illustrates this conception of the military sector as a user of various types of resources in a simplified way:

- All military activities must be financed; thus, military expenditures are a vital determinant of the size of the military effort. They divert economic resources of a state and the economy as a whole from social production.

- Armed forces, and the other operations in the military sector, need personnel, drawn from the population base, with a general emphasis on young males.
- Industrial expertise and production equipment are used for the production of weapons and other military equipment.
- Armed forces and military sectors require land and infrastructure for bases, barracks, training ranges, etc.
- Where armed forces are engaged in private sector entrepreneurial activities, they may present barriers to entry to private firms.

A distinct conceptual difference exists between the financial resources acquired by armed forces and partly redistributed to other operations within the military sector, and the other, physical resources often paid for with money given to armed forces. To a large extent, counting both financial resources and physical resources comes to double counting of resources claimed by military sectors. Nevertheless, both financial and physical inputs are considered in this report. The analysis of both sides brings interesting insights into the economic aspects of the operations of armed forces and possible gains from the downsizing of such operations. The physical inputs become assets when used by the armed forces to produce its output, the difficult to define product called “national security.” The various types of assets, in a broad sense combined in the military sector, are discussed in more detail below.

Conflict and military sectors

Militarized conflict is, almost by definition, accompanied by increased military resource use and the build-up of military assets. In severe conflicts, the military resource use will be so intensive that it is not sustainable over long periods of time; “resource overstretch” is an important factor in making conflict situations “ripe” for solution (Zartman, 1989). Thus civilian resource reuse becomes a precondition for post-conflict economic development.

The growth of armed forces and military sectors in conflict situations often is haphazard, as it occurs under great pressure. Combatants will not receive proper training, weapons are stocked simply because they are available, and military bases are occupied without proper planning. While such asset accumulation may not be optimal for maximizing the military output, it can make later civilian resource reuse simpler because the specificity of military resource use is lower.

Extensive military resource use fosters special interest groups benefiting from continued conflict. These can include suppliers of military goods (see below), but also non-military goods, such as food. In a number of conflict situations, armed groups, or sections of them, have themselves developed a vested interest in the continuation of conflict. Internationally banned drugs are a case in point; their production flourishes

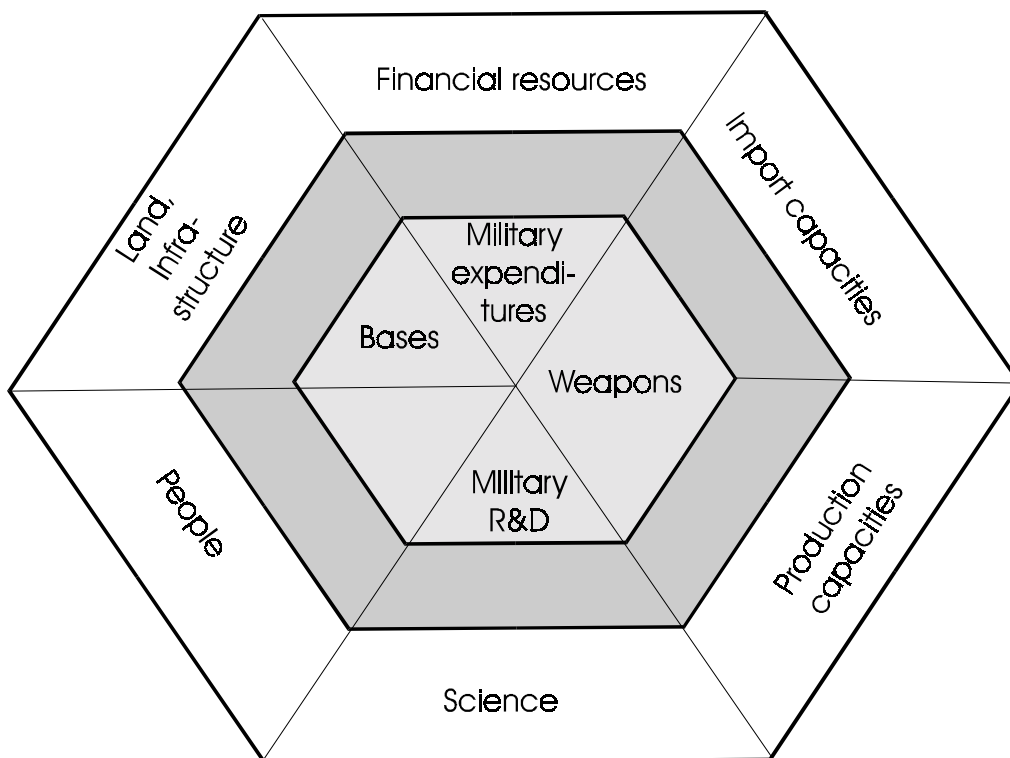
within the instability caused by armed conflict in a number of places (Jean and Rufin, 1996).

Any reduction in military resource use provides opportunities for other, civilian use or reuse, although it may not be considered disarmament in a strict sense (Laurance and Wulf, 1995). Downsizing may or may not increase relative efficiency in providing the product of national defense. At times, some of the resources released from inefficient production of security may be retained by the military sector to modernize security capabilities. Transformation of the military sector may redeploy assets toward new security concerns. Economic gains may be indirect, such as the case where modernization is tied to better radar systems for environmental monitoring or coastal patrol boats to police overfishing within a nation's Exclusive Economic Zone (EEZ).

Criteria for a typology of military assets

Military assets can be classified in various ways. The most important of these flows from viewing armed forces and military sectors in economic terms, as organizations turning resources into assets and combining them to produce an output. This results in

Figure 1: Resource use and combination in the military sector



a list of military assets discussed in the next section. Here the focus is on post-conflict asset reuse, and assessing the difficulties and possibilities of such reuse.

Categories of military assets

The operation of armed forces can be viewed in monetary, as well as physical terms. They need income to pay their personnel and for the purchase of goods and services. Because it is of interest to look at both sides, all aspects are considered here, although not all of them constitute assets in the proper sense. An important resource, and an asset in a broad sense, is the personnel in the armed forces and other organizations constituting military sectors. Military land and military equipment are assets in a narrow sense. The production of weapons and military business activities in civilian markets are two more economic factors within the military sector. The financial means available to armed forces come from a variety of sources, discussed in detail below under the heading of *military sources of funds/entitlement*.

Specificity of use and users

Another way to look at military assets is to analyze whether they are in exclusive use by the military or are also used for civilian purposes. This is obviously of great importance for the possibilities of civilian reuse.

The above discussion of resources and assets implies that the degree of specificity will generally increase from largely fungible resources to more military mission-specific assets. However, not all assets used by armed forces need to be military specific. Transport vehicles, for instance, can be civilian. On the other hand, incomes by armed forces, which, as financial flows, seem to be highly fungible, may be contingent on military missions, for instance as military assistance coming from another country.

There are other factors complicating the question of specificity of use and users. First, specificity is relative. It may be prevalent for the asset as it is, but be lower if the asset is put into a different environment, or considered in parts. A warship has little civilian use, but contains valuable scrap metal. Second, specificity may not derive from technical or physical criteria but economic or legal ones. The civilian reuse of military land may be possible, but not economical, because of a lack of demand for such land. The reuse of weapons may be possible, for instance for individual security, but not legally acceptable.

Conditions of assets and personnel

Another possible categorization of military assets is their physical condition, which can have an influence on civilian reuse potential. The most obvious case is wartime destruction of assets, for instance of military airports. Age and degree of usage can also

be a consideration in this respect. Ammunition, including mines, presents a special concern as their safety generally degrades with age (GAO, 1996a). Similarly, ex-combatants may not be fully capable of becoming productive members of their societies, because of physical or mental handicaps or lack of training and education over generations of combatants.

Reuse potential and challenge

The goal of civilian reuse of military assets is a contribution to economic development, but direct civilian reuse without some modification of assets is limited to the most fungible resources. In general, investment will be required before reuse. This raises the question of whether such investment makes sense in terms of the benefits of civilian reuse. The question has a narrow economic side, but often also raises other issues, for instance ecological and security considerations. Some military assets promise little economic benefit, but must be destroyed to free complementary assets. The most obvious case is landmines, but there are many other examples such as environmental cleanup of testing facilities. Humanitarian and environmental concerns of potential harm may complement potential economic gains to prompt cleanup or destruction of dangerous sites. This example illustrates that military assets can become civilian liabilities, an issue that will be picked up again in the last section of this report. The following section, however, focuses on assets that provide civilian reuse potential.

Military assets: categories and potential

In the following discussion of military assets, each section begins with a description of what, in theory, might be candidates for productive conversion; identifies information sources for the relevant category; and concentrates on describing productive reuse, its potential, and pitfalls.

Human resources and capital

Former soldiers and ex-combatants from a human resource perspective

Armed forces consist foremost of people. While their training in the armed forces is designed to optimize their contribution towards security, some of their skills and experiences gained during service will have civilian applications. In some cases, armed forces deliberately train for later civilian jobs. In addition, depending on the circumstances and procedures of armed forces, members may have received civilian education or training prior to or during service. As a result, armed forces can contain a reservoir of capabilities that can be used in civilian economies (Ball, 1988; Nübler, 1997). Releasing people from the armed forces can make a contribution to the

development of civilian economies. It will also, in most cases, result in a reduction of costs as personnel usually constitute the largest part of military expenditures (Ball, 1984a). Some of the gain, however, may accrue over time, as military pensions comprise a bulk of the outlays.

On the other hand, the civilian post-conflict economy may have difficulty absorbing additional labor. Former soldiers and ex-combatants become just one more group of persons swelling the ranks of the underemployed and unemployed, or they displace civilians. Especially in post-conflict situations, large reductions in armed forces' personnel can put a heavy burden on economies. If this problem is not tackled, it may jeopardize economic development and peace building as frustrated ex-combatants use their specific military-style skills in criminal activities or violent political opposition.

Some of the factors that shape the possible contribution of former combatants to civilian economies include:

- Personal status, including health, handicaps, etc.,
- Level of training in civilian skills,
- Appropriateness of available skills to demand for skills,
- Length of service, and
- Personal motivation.

In post-conflict situations, demobilization is often a highly contentious process with close links to the early, shaky phases of a peace process. It involves complex tasks of registration, encampment, disarmament, and so on. This usually has to be followed by a phase of settling ex-combatants in the communities where they come from or places where they intend to make a living. Only then can the reintegration process of making ex-combatants productive members of societies begin.

Data sources

Information on personnel strengths of armed forces is available on an annual basis from two standard sources, the International Institute for Strategic Studies' *Military Balance* (IISS, 1998) and the US Arms Control and Disarmament Agency's *World Military Expenditures and Arms Transfers* (ACDA, 1997). There are considerable differences between the two sources for many countries. In general, the data given by the IISS is more detailed. The IISS also gives some figures for paramilitary and opposition forces, but such data usually is hard to come by and therefore must be used with caution. Data on the personnel of armed forces can also be found in some reference books such as Keegan's *World Armies* (Keegan, 1983).

Information on demobilization and large-scale troop reductions generally becomes available with peace agreements or through announcement by governments and organizations. Data of this type is collected, for instance, by the Bonn International Center for Conversion and published in its annual *Conversion Surveys* since 1996 (BICC, 1996). (See also Box 1.)

Box 1: Examples of Recent Demobilizations in Africa and Central America

Angola	A demobilization of about 76,000 ex-combatants of the Angolan Armed Forces (FAA) and the National Union for the Total Independence of Angola (UNITA) was agreed upon in 1994; after initial progress in encampment and demobilization, the demobilization is seriously in jeopardy; many of the about 20,000 UNITA fighters formally demobilized might still be under UNITA command.
Chad	15,000 soldiers were demobilized in 1992–1994; an additional demobilization has been announced.
Djibouti	About 8,500 soldiers are planned to be demobilized.
El Salvador	30,000 members of the regular armed forces were demobilized between 1992 and mid-1993; 8,000 Frente Farabundo Martí para la Liberación Nacional (FMLN) opposition forces were demobilized in 1992.
Eritrea	55,000 ex-fighters of the Eritrean People’s Liberation Front (EPLF) have been demobilized since 1993.
Ethiopia	Almost half a million soldiers of the defeated Derg army were demobilized in 1991; between 1992 and 1994, another 22,200 fighters of the Oromo Liberation Front (OLF) were demobilized.
Guatemala	24,000 “military commissioners” were demobilized in 1996; the government committed itself to reducing the armed forces by 33 per cent in 1997 (15,633 armed forces personnel were demobilized as a result) and to the full demobilization of the 200,000-strong “Voluntary Civil Defense Committees.” In addition, about 2,928 guerrillas of the URNG were demobilized in March–May 1997.
Haiti	6,250 soldiers were demobilized between late 1994 and April 1996.
Liberia	Between November 1996 and February 1997, 20,332 fighters have officially disarmed and demobilized; new national armed forces of about 5,000 are being created.
Mali	About 4,000 Touareg fighters were demobilized following the 1992 peace agreement with the government.
Mozambique	70,910 soldiers of the government forces and 21,980 of the Renamo opposition forces were demobilized in 1992–1994.
Namibia	All of the about 23,500 people fighting for South African forces in Namibia and 26,000 combatants of the People’s Liberation Army of Namibia (PLAN) were demobilized in 1989.
Nicaragua	The national armed forces demobilized 65,000 soldiers between the end of the 1980s and 1992; 23,000 “contras” were demobilized in 1992.
Rwanda	In late 1998 the government announced that 3,000 soldiers were to be demobilized.
Sierra Leone	Demobilization plans were shelved after a military coup in May 1997.

Somalia	Several—but thus far largely unsuccessful—demobilization efforts have been made since 1992
South Africa	The integration of seven armed forces into the new South African National Defence Force (SANDF) begun in 1994 was completed in 1998; the further downsizing of the SANDF from 93,000 to 70,000 is to take place in the second half of 1999 as part of the armed forces’ “rationalization” process.
Uganda	36,350 soldiers were demobilized between the end of 1992 and October 1995

Sources: Kingma, 1998; BICC, 1998, 1999

Demobilization and reintegration issues

Demobilization factors

A considerable number of countries in Africa, Central America, and Asia have seen large reductions in the number of persons in their armed forces, which can properly be called demobilization. Each case of demobilization involves a distinct political and socio-economic context. Still, some patterns stimulating demobilization can be recognized:

- A peace accord between fighting parties,
- Defeat of one of the fighting parties,
- Perceived improvement in the security situation,
- Shortage of adequate funding,
- Perceived economic and development impact of conversion, and
- Changing military technologies and/or strategies.

Most demobilizations in the past decade have occurred at the end of a violent conflict, though context and method vary, ranging from victory of one side and defeat of the other to stalemate resulting in a process of first unifying existing armed forces and then scaling them down.

The entire process of demobilization and reintegration and the institutions involved differ in each case. Generally, once the decision to demobilize is taken, practical plans must be devised and financing ensured. Because frequently the demobilization is occurring in countries devastated by war, the need for outside support during demobilization is great (Ball 1998c). At the time of demobilization, a “package” in cash and/or kind is usually provided to assist the ex-combatants in the early stages of resettlement. These may include foodstuffs, civilian clothing, household

utensils, building material, seeds, or agricultural implements. Substantial support is often required to transport ex-combatants to where they come from or where they want to settle (Coletta et al., 1996a; Kingma, 1999).

Reintegration challenges

The main challenge generally comes after demobilization and lies in the reintegration of the ex-combatants and their families into civilian life. All the millions of people who have left the armed forces over the past decade faced—and many still do—the enormous challenge of finding alternative employment and of reestablishing themselves in civilian life. A considerable body of review work has recently been written on the demobilization experiences of African countries (for example: Berdal, 1996; Cilliers, 1995; Colletta et al., 1996b; Kingma, 1996 and 1998). Some of the major lessons learned in these reviews, particularly focusing on Africa and Central America include:

- Successful demobilization requires cessation of hostilities, the existence of the political will to proceed with demobilization, and the full support of all parties.
- Non-availability of adequate funds jeopardizes the entire demobilization process.
- Planning for demobilization should start as early as possible in the peace process.
- Sufficient provision of basic needs at the encampment stage is critical.
- Careful disarmament of combatants who are to be demobilized is an essential prerequisite.
- Although it is important to provide special assistance to the ex-combatants, they should not receive more support than necessary to help them attain the standard of living of the communities in which they are trying to reintegrate themselves.
- Use should be made of the wide range of instruments that exist to facilitate reintegration such as counseling, technical and managerial training and advice, provision of tools, credit facilities, construction of houses, improvement of social infrastructure, creation of short-term employment, and so on.
- Support programs should be designed using a case by case analysis based on the needs and aspirations of the ex-combatants and their families.
- Health care and special assistance to the disabled are important components of effective reintegration programs.
- Special support is required for former child soldiers, female ex-combatants, their children, and the wives of ex-combatants.

- Demobilization and reintegration supports are most efficient and effective when coordinated by one central civilian agency and implemented as de-centrally as possible.
- Donor agencies should be able to provide flexible support.

Field level research shows that the reintegration is not one general process, but consists of thousands of micro-stories, with individual and group efforts, and with setbacks and successes. Some interesting and useful research has been done at this level, but additional research is warranted for an accurate picture of the distinct circumstances of ex-combatants in specific regions, and especially the role of women in the reintegration process. Psychological adjustment also appears difficult; ex-combatants have trouble adjusting their attitudes and expectations. Military personnel and guerrilla fighters are experienced in top-down methods of management, which often contradict the appropriate approaches for management and entrepreneurship in the civilian sector. Ex-combatants must go through a personal process of adjustment, after losing a predictable environment with a certain social status—positive or negative. They are forced to rethink their ambitions and capabilities. In addition, large numbers of the demobilized suffer from psychosocial problems due to post-traumatic stress disorder; for example, a very high incidence of this disorder is believed to exist among ex-combatants in Angola and Mozambique. Empirical data on this phenomenon is still very limited and the most effective types of counseling or other therapies remain topics of debate.

Outside support

External support programs for demobilization and reintegration are increasingly perceived as critical for the sustainability of peace and as concrete steps towards broad-based human security and development (Colletta et al., 1996b; GTZ, 1996; Mahling Clark, 1996). Among the agencies involved, such as the GTZ (the German Gesellschaft für Technische Zusammenarbeit), USAID (United States Agency for International Development) and UNDP, the World Bank has established itself as the predominant actor in support of the demobilization and reintegration of ex-combatants in post-conflict situations. The Bank has gained considerable experience in this field and is expected, both internally (World Bank, 1998, p. 4) and externally (Ball, 1998c) to continue to be a leading agency in future demobilization efforts.

Important lessons have been learned with respect to external support (Ball, 1998c), including:

- The importance of institutional support spanning the functions of strategic planning, coordination within the government and with the donor community, and oversight of implementing agencies;
- Flexibility and quick reaction to challenges on the ground;

- Special attention for vulnerable groups;
- Efficiency controls over donor influence over program development and implementation need;
- Necessity of needs assessments on the ground; and
- Balance between special treatment for ex-combatants and general support for others affected by conflicts.

Dealing with the reintegration issues of demobilized combatants does not imply that policy design must start from scratch. Experience gained with returning refugees and internally displaced people, as well as with the retrenchment of public servants within structural adjustment programs, contain useful lessons (Kiggundu, 1997).

Demobilization and reintegration success

The experience with demobilization and reintegration is, by and large, encouraging. Demobilization efforts have helped stabilize peace and reconciliation processes. The economic reintegration of ex-combatants has often been difficult, but not more so than for other persons affected by displacement and wars. Recent research in Ethiopia, for instance, shows that the ex-soldiers are indeed generally poor, but they are not significantly worse off than civilians in the same location without a military background (Dercon and Ayalew, 1998). The World Bank has drawn the conclusion from its own work that demobilization and reintegration have substantially decreased defense expenditures in countries that have experienced recent conflict, releasing necessary resources for civilian reconstruction (World Bank, 1998, p. 33–34). In a recent study of four African cases of demobilization and reintegration this conclusion was largely confirmed (Kingma, 1999). However, it remains to be seen whether more long-term studies will be able to replicate these findings. In some earlier cases of demobilization, such as Zimbabwe, war veterans have violently expressed their discontent with reintegration, while in others, such as Angola, demobilization has not prevented resurgence of conflict. More research over time and on a growing number of cases may be able to help us ascertain to what extent and how demobilization and reintegration can best promote sustainable peace and economic development.

Military land

Armed forces and military sectors occupy land for their operations. As part of military downsizing, armed forces are often willing to release land for civilian use, as unused or underutilized bases lead to unnecessary maintenance and security costs. National governments have also, in past cases, allowed armed forces to take in some of the proceeds from land sales. It is also true that governments may have an interest in

closing bases against the wishes of the armed forces if this allows for a more productive use of the occupied land. The necessary relocation of forces will, however, in general lead to investment costs.

Types of military land

A basic distinction can be made between land on which superstructures is built and that which is basically left barren. Assets that are productive, as well as technological facilities, will be considered in a later section.

- **Training areas:** Large sections of land are used by armed forces for training purposes. Training fields, shooting ranges, etc. are often in remote areas, but have housing and logistic facilities.
- **Airfields and airports:** These are often well equipped and in good shape, as the high performance criteria of military aircraft require high-quality airport facilities. These facilities are also likely to have barracks and logistics centers.
- **Naval ports:** These can range from simple mooring facilities to large-scale logistic centers with extensive buildings and housing facilities.
- **Logistic facilities:** Armed forces generally operate their own logistics; not just at air fields, air ports, ports, or parts of ports, but also at dedicated logistic centers and storage facilities. Maintenance, repair, and production facilities, discussed in more detail below, also require land with superstructures.
- **Barracks:** Regular forces normally house their personnel. Often barracks are close to other military facilities, such as training areas or logistic facilities.
- **Command and control facilities:** Armed forces and their ancillary organizations often have elaborate command and control systems, which include not only administrative centers but more secretive and less vulnerable command centers for times of war, observations posts, meteorological stations, intelligence posts, communication posts, etc. What appears to be a large number of military bases is often the result of an extensive network of command and control facilities strewn over a country.
- **Testing grounds:** Armed forces hold land to test weapons, ranging from simple firing ranges to the testing of missiles or major weapons systems.
- **Education facilities:** Depending on the nature of the education to be provided, educational facilities can be adjacent to training ranges, logistic facilities or, in the case of more general education, barracks.

- **Service facilities:** In all kinds of military installations occupied by larger numbers of military personnel, service facilities such as kitchens, are present.
- **Other:** Armed forces sometimes occupy land to perform functions that are not directly related to their main functions, such as environmental observation posts, geological stations, etc.

Important distinctions must be made with respect to the condition of the land and its superstructures:

- **Environmental pollution problems:** Training ranges in particular can be environmentally contaminated, with conventional pollution, for instance from motor oil, but also through live munitions. Few armed forces take the necessary measures at their training ranges to avoid such pollution and initiate regular cleanup. The problem is not confined to training ranges alone; for example, ammunition storage facilities, either at airports and ports or stand-alone, often present specific environmental hazards.
- **Condition of superstructures:** While some military facilities are modern and well-maintained, experience shows that for armed forces investment in the maintenance and repair of existing facilities has low priority. Where many developing economies have suffered periods of economic crisis and fiscal restructuring, investments have been long postponed.
- **Specificity of superstructures.** In general, superstructures on military land, such as buildings and facilities have a high civilian reuse potential. There are numerous problems in specific cases, though, that range from different technical standards used by the military and civilians (for instance in air traffic control) to different cultural standards found in armed forces and among civilians (for instance the acceptability of housing).

Finally, it is useful to distinguish between foreign and domestic bases. Especially in lower income countries, foreign bases often provide higher quality superstructures than domestic bases. Foreign owners, or users, of bases may however ask for compensation for handing over infrastructure that they have built or improved. Facilities may also be stripped of productive assets if the departure of foreign personnel is not amicable.

Data on military land use

Governments are the most important source of information on military land use; a number of countries, including South Africa, release such information to the public (South African Department of Land Affairs, 1997). Good international data on military land use and superstructures is lacking and no effort seems to have been made so far to collect such information systematically. The location of naval ports can be found in standard sources on naval forces, such as Jane's Fighting Ships (Jane's, 1998). Likewise,

information on major air bases is contained in standard sources on air forces. The IISS Military Balance also gives locations for major bases (IISS, 1998). Somewhat outdated information on foreign military bases is contained in a book published by the Stockholm International Peace Research Institute (Harkavy, 1989). The Institute has plans to release an updated version.

Reuse and redevelopment opportunities and challenges

Military land and superstructures which armed forces are prepared to give up have a large reuse potential. Military specificity is generally low, but there are still major challenges to base reuse and redevelopment, which are discussed in more detail below.

A related question is that of the value of land and superstructures. The value depends on characteristics and conditions of bases, such as the ones discussed above. In addition, a certain level of investment is almost always required before productive civilian use is possible. The question then becomes whether potential reuse and redevelopment is economical and who will finance the investments necessary for the transition. Privatization or private-public partnerships are generally the best road to reuse and redevelopment. Case studies of land conversion can be useful in determining re-investment and reuse conditions.

Potential obstacles

Major reuse challenges include:

- **Institutional issues:** When armed forces release military land to civilian use, different types of questions about ownership and regulatory responsibilities frequently arise. First, often the previous civilian owners re-claim ownership, either because they were not properly compensated, as was for instance the case in South Africa, and/or because they were forcibly removed from the land. Second, armed forces will generally expect compensation for the hand-over of the land, especially if they have financed the construction and improvement of superstructures. Complex financial arrangements are sometimes made to compensate the armed forces indirectly for the loss of these assets. Institutional questions may arise over the appropriate use of such funds, such as in the case of Fort Bonifacio in the Philippines. Third, there is often confusion over which institution should oversee and regulate the civilian reuse of military land and infrastructure. In some cases, the armed forces themselves want to market the land, but usually civilian government agencies take over. In many countries, responsibilities are divided between government agencies and ministries at the central level, and with regional governments or communities where they have a role, for instance in planning and zoning. Often these bodies do not have the expertise or the experience necessary to convert military bases to civilian use. In some countries, such as the Ukraine, confusion over responsibilities and lack of government capacity has delayed the marketing of former military bases (Cunningham, 1997).

- **Environmental cleanup:** Pollution on military bases is, unfortunately, quite widespread. For instance, the U.S. Department of Defense has detected about 27,000 potentially contaminated areas on 9,700 of its domestic sites (CBO, 1995), with petroleum and lubricants being the most common sources of contamination. Cleanup costs are high where environmental standards for reuse are high. Although the party responsible for this contamination is usually clear, it is harder to establish responsibility for cleanup. Armed forces often are unwilling to do the cleanup or pay for it, leaving this job to the first civilian owner. Foreign troops generally leave the cleanup of their foreign bases to the host country. These costs need to be incorporated into estimates of investments prior to reuse. There is also the risk of future discovery of unknown contaminants at certain sites.
- **Diversity of facilities:** Military bases often consist of different types of facilities in different conditions, and not all may be re-usable, such as ammunition storage facilities. Also, armed forces sometimes would like to retain the use of certain facilities within the installation while giving up others, thereby complicating civilian use.
- **Asset stripping:** Depending on the circumstances of the transfer of military bases, asset stripping may occur and result in a loss of value of superstructures. Armed forces, particularly if they have not been properly compensated, may move parts of the superstructure away and thereby degrade the rest. If there is not proper supervision, individuals may take along what they consider valuable. This happened at former Soviet/Russian bases in Eastern Europe (Cunningham, 1997). There is often a critical period after armed forces have moved out of military bases and before civilian use begins, especially if facilities appear abandoned or are unguarded. Civilians may take away what they find useful, or take over buildings as squatters, as occurred at the former U.S. Clark Air Force base in the Philippines and at Coco Solo, a former U.S. military family housing area near the Atlantic opening of the Panama Canal (BICC, 1999). Strong local governance, like that at Subic Bay in the Philippines, is critical to success.
- **Political dynamics:** Several political factors can reduce the likelihood of base reuse and redevelopment. First, in cases where a military base has brought income and jobs to a region, closing a base will lead to local political opposition. Second, where the long-term stability of the political situation, especially with respect to the role and the influence of the armed forces, is not clear, there may be a fear among potential reusers that bases will be re-occupied by the armed forces and their investments lost. Third, if there are several reuse alternatives, decisions may be influenced by political factors, rather than economic ones, especially in a volatile political situation.

Investments

Base reuse and redevelopment usually need some form of investment, for cleanup, repair, modernization, etc., of the facilities themselves, and construction of infrastructure to link military bases to civilian networks of communication and traffic. The level of investment to make military land re-usable can vary widely, depending on the type and conditions of the military facilities and the planned reuse. In many cases, it is difficult to predetermine exactly the necessary level of investment, especially of environmental cleanup. In such cases public entities often finance some of the investment, with hopes of later recouping costs from private users.

Valuation

While the reuse potential of land and superstructures is high, their **market value** depends on other factors; for example location, type of facilities, condition of facilities, cleanup costs, and redevelopment investment costs. This is a function of the demand for the types of assets—land, buildings, port facilities, airport facilities—within a real estate market, and their scarcity in relation to the financial means of potential users. For some of the assets, such as housing, the market will be predominantly local; while for others, such as airports and ports, it can be international. The value of such assets will often be low in damaged and depressed post-conflict economies but will increase with growth. This introduces questions of timing in asset conversion. The experience in Europe, where most of the more than 6,000 estimated base closures of the 1990s have taken place (BICC, 1996), make this point clear. Base reuse and redevelopment has been an economic boon in the United States, and may still be quite successful in Western Europe. In Eastern Europe many of the more attractive sites are reused productively while others remain deserted.

Reuse and redevelopment

Former military bases have been put to a wide range of civilian uses. Some of them are obvious, as when military airfields become airports, or training areas become forests. But there have been many other forms of use, such as aircraft shelters as horse stables and barracks as universities (BICC, 1996, p. 197).

In the majority of cases privatization has been the preferred form of productive reuse of former military land and superstructures. Privatization allows competition for the most productive use of the land and the superstructure and unburdens governments from a task they are usually not equipped to handle. Even so, the length of the period between the end of military use of a base and privatization has not been uniform. In many cases, private investors expect public bodies to make the risky initial investments into cleanup and decontamination. Investors and venture capital financiers often shy away from base redevelopment projects due to the obstacles discussed above (Seth, 1996). Public bodies often want to have a say in what type of use former military bases are put to, trying to optimize their interests, for instance in the creation of jobs, in

the process of privatization. Private-public partnerships have come about in many cases of base reuse and redevelopment, serving the interests of both parties.

Examples of successful base conversion and development

Extensive experience has been gained with base reuse and redevelopment in Europe and the United States (for an overview see BICC, 1996, pp. 174–210; Cunningham, 1997; Bishak, 1997). In the United States and Western Europe, reuse has been extensive; the economic results of base redevelopment have been promising. Base reuse and redevelopment in Eastern Europe is lagging behind.

Research in the United States showed that base closure communities had some problems because of losses in employment and effective demand in the short-term but that civilian regional development led to better economic benefits in the long-term. RAND published a report that showed communities did not even suffer substantially in the short-term (Dardia, et al., 1996). The U.S. General Accounting Office reported few job losses when major maintenance depots closed (GAO, 1996b, pp. 28–29). Base redevelopment gets more successful over time. For bases closed before the end of the 1980s, communities had created two new jobs for every one civilian job they lost on closed bases by the early 1990s (EAC, 1993). Case studies for Germany similarly point to extensive reuse with gains in regional demand and employment.

Fewer base closures have occurred outside Europe and the United States. Some better known examples are closures of foreign military bases. One example which has caught much attention, not least because of the involvement of the World Bank, is that of Subic Bay and Clarke Airfield in the Philippines (see Box 2), another is former U.S. bases in Panama. South Africa, which has decided to close and redevelop a number of bases, again with the help of the World Bank, is likely to emerge as another center of expertise on base closure and reuse. The potential for further base reuse outside of Europe and the United States is currently difficult to assess, because of the lack of information. It should be underscored that the lessons of international base closures have important applications to less ambitious redeployments of defense assets. The factors discussed above in the physical transfer are applicable across a range of cases.

Box 2: Base redevelopment in the Philippines

Conversion of Subic Bay and Clark Air Force Base in the Philippines

The 1991 rejection by the Philippines of the treaty with the United States for the Subic Bay Naval Facility and the Clark Air Force Base brought a nationalist euphoria but a huge economic challenge: the replacement of 42,000 jobs and \$500 million in annual income to the economy. Located 50 miles from Manila, the 1992 departure of the American forces from Subic left US \$8 billion in facilities, including a natural deep water port, military grade telecommunication facilities that can handle up to 13,000 lines, an inexpensive, skilled English speaking labor force, an airport capable of landing a Boeing 747, thousands of warehouses with potential for conversion into factories, one of the largest ship repair facilities in the world, a 26.4 megawatt power plant, hundreds of residential housing units and offices. Leisure facilities including golf courses, swimming pools and a yacht harbor made the 18,000 hectare site an attractive option for development. The jungle surrounding Subic, used to train pilots and marines in warfare and survival, was not logged bare like most of the country's hardwood forests and remained available for eco-tourism complete with monkeys, wild boars, and aboriginal tribes. The potential was high but achieving successful conversion rested on leadership, establishing transparent and accountable procedures, and the development of complementary infrastructure.

Despite the attractive physical infrastructure, the task of replacing jobs and income was not simple. Short and long-term challenges arose. The mayor of adjoining city of Olongapo, Richard Gordon, was appointed commissioner, with a paid staff of 1,400 and volunteer workforce of 8,000, engaged in upkeep and security of the area. He was allocated US \$4.4 million out of a projected US \$12 million budget to transition Subic, principally to buy equipment and property. As the US was pulling out he was able to buy machines and used autos from the US command for about 12 cents for each dollar of market value. Systematically playing to the pride of local residents, Gordon rallied volunteers to guard Subic from looters and then persuaded President Ramos to declare the former base a special economic zone, exempting investors from paying local and import taxes on materials, capital and equipment.

By 1994, 40 foreign and Filipino companies with total equity of US \$400 million had established operations, but total employment only reached 7,000, a fraction of the 160,000 planners hoped to create. Certain investors held off due to the absence of complementary infrastructure. While there were indeed good deepwater facilities, the port was relatively inaccessible to the rest of the country. There was a clear need to construct roads to link Subic with North Luzon Expressway to make the facility an attractive industrial zone. Furthermore, as a former navy facility, it lacked a strong commercial and industrial dimension. The port needed industry to support its volume, but industry needed a stronger, more stable investment climate for aggressive expansion. Risks for investors included inconsistent and poorly defined government incentives, political infighting, and initial uncertainties in processing applications. Others found lease rates relatively high compared to the widely depressed rates in the rest of the country.

In addition to the residual infrastructure, the US also left behind an environmental disaster. While U.S. Dept. of Defense spokespersons noted compliance with host country laws, toxic levels due to fuel leaks seeping into the soil and water tables and lead in landfills raised questions of safety. The basing agreement did not include cleanup. A Freedom of Information Act request also uncovered evidence of PCBs at Clark over safe levels. A World Bank conversion plan recommended closure of a ship repair facility for environmental reasons. In considering new investments, questions of conflicting jurisdictions for environmental certification between the SBMA (Subic Bay Metropolitan Authority) and the national EMB (Environmental Management Bureau), an arm of DENR (Department of Environment and Natural Resources) slowed the process.

Despite difficulties, an industrial core slowly formed. Among the 279 investors in the free port were Enron Power, operating the navy's former 30 megawatt power plant and building a new 111 megawatt

plant; Enron is now basing its Pacific Rim operation in Subic. FedEx set up its Asian hub at Subic in 1995 and has agreed to upgrade and lease for another 5–10 years. Coastal Petroleum is another U.S. firm, investing \$105.8 m to operate the petroleum, oil, and lubricant facilities left behind. Frolics Shoes, a Taiwanese based firm, produces for Reebok, LA Gear, and Timberland. The Taiwanese provided US \$23.57 million in soft loans to develop land at the base. Since the free port was created in 1992, there has been a cumulative total of US \$2.4 billion of committed investments. Under the Estrada administration, 4,126 jobs were created; in 1998 US \$14.3 million in earnings with export totals of US \$1.53 billion were achieved.

The SBMA is trying to turn the area into a regional growth center with assistance from the Japanese International Cooperation Agency. Port modernization is one of four pillars of Subic's development; the other three include tourism, expansion of growth to include towns and provinces, and the creation of an information corridor in the region. Plans to boost tourism include an underwater observation tube that will showcase Subic's historic bay and rich marine life.

Clark has also seen slow but significant development. The U.S. abandoned the air base in wake of the Mount Pinatubo eruption. Volcanic ash made it difficult to take off and land; many buildings were destroyed. The Philippines Armed Forces mobilized 1,500 soldiers, opening the airport in 1993 for freight and small planes. The residual infrastructure of a hospital, high school, officers quarters, stores, family housing units and recreational facilities in golf, riding, tennis and pistol ranges has been turned into an industrial and leisure resort. However, political scandal has surrounded the development at Clark, underscoring the need for transparent processes and accountability in the conversion of military facilities to civilian ends.

Lessons from Clark and Subic underscore the need for a strong and well-conceived transitional plan to set up the institutional framework to guarantee the secure transfer of unviolated property. Development must be conceived of not only in terms of the facility itself, but include ways the facility can become a springboard for an integrated regional plan.

Military production/service facilities

This section addresses questions related to the possible transition of military production and service facilities from the military to the civilian sector. Two important, and intertwined, issues need to be distinguished, the question of ownership devolution, which includes privatization, and that of changes in production or service output from civilian to military goods, what is often called industrial conversion.

Types of facilities

Military production and service facilities need not be owned by armed forces, although this is often still the case in developing countries. A wide range of forms of ownership can be found:

- **Military arsenals run by armed forces.** These generally are managed by officers and staffed by a mixture of soldiers and civilian technicians and workers employed by the armed forces or defense ministries. Arsenals generally have no independent budget or accounting procedures. Pricing procedures for products and services are

absent or based on partially arbitrary estimates. Their economic efficiency can not be properly evaluated.

- **Government facilities.** While usually controlled by defense ministries, government facilities can also come under ministries for technology or public companies. Generally managed by engineers or scientists and staffed by civil servants, they typically have independent budgets, sometimes in conjunction with similar facilities fully, or to a large degree, financed from government budgets. Pricing and efficiency measurement is often difficult.
- **Government-owned privately managed facilities.** Some governments prefer to safeguard that production or capacities are maintained but under a civilian management which is efficiency-oriented. Such constructions are often found in research and development, but sometimes, for instance in the case of tank production in the United States, in weapons manufacturing.
- **State-owned privately registered companies.** Such companies generally operate as private companies, though they are often preferred suppliers to the armed forces. State ownership can range from 100 % to a “veto share” giving the state the right to block decisions viewed as detrimental to its interests. Such companies are often “national champions” for certain types of weapon systems or militarily relevant technologies.
- **Private arms producers.** Even private arms producers operate in highly policy-dependent markets because of monopsonistic domestic demand and government regulation of exports. However, they can make their decisions for reasons of efficiency based on standard accounting procedures.

Arsenal-type military facilities remain attractive to armed forces even in industrialized countries, especially for maintenance of weapon systems. Historically, arsenals have been the preferred way to produce and maintain weapons from the 17th century. In the middle of the 19th century, nations like the United Kingdom began to allow private companies to produce weapons while still maintaining arsenals (McNeill, 1982). Today, arms production is widely privatized in a number of industrialized countries, such as the United States, the United Kingdom, and Germany, but not, for instance, in France. Privatization of defense industries is also under way in many former socialist countries. Even in countries with largely privatized defense production, service facilities have often remained under the control of armed forces. Privatization of service facilities is currently under review in the United States and Germany (Weichhardt, 1994).

With respect to the second criterion mentioned above, type of product or service, a number of categories of facilities can be distinguished, which jointly form what has been called the “defense industrial base” (Dunne, 1995):

- Producers of military systems.
- Producers of dedicated components.
- Producers of relevant basic products (steel, aluminum etc).
- Producers of dual-use technology.
- Research and development facilities.
- Service facilities.

The boundaries of the “defense industrial base” are difficult to draw, unless a government has decided to procure weapons and services from a limited set of highly specialized companies. But in many cases, companies, whether private or government-owned, will produce civilian goods as well as military hardware and sell to military as well as civilian markets. Even armed forces arsenals often sell to civilian markets. Even more difficult is the distinction with respect to technology, especially in electronics where almost everything is dual-use (OTA, 1992; Gansler, 1995).

Sources of Information

Information on military production facilities is not easy to come by if there are more than a handful of possible candidates in a country. Even governments may not have an exact inventory for privately owned arms producers competing for open bid contracts. Depending on the specificity of the products and production methods, the distinction between arms producing and civilian production capacities will be blurred. Procurement agencies will have lists of prior contractors, and some knowledge of possible suppliers, but these will seldom be completely up-to-date and comprehensive. Only countries that have tightly government-controlled or -owned arms production sectors (“military-industrial complex”) have a concise knowledge of production capabilities.

There are no comprehensive international sources on arms production facilities, as there are for other aspects of military sectors. A relevant database is kept at the Stockholm International Peace Research Institute and excerpts have been published (Brzoska and Ohlson, 1986; Anthony, 1993). In addition, data sets for individual countries and regions have been published by government agencies and individual researchers. Information needs to be collected from a variety of sources, including government lists of suppliers or producers put out for commercial purposes. In addition to information available from governments, the most important source for information is commercial publications and trade journals. Many arms producers advertise and some specialty companies aid their marketing through the collection and dissemination of information in military markets. The Jane’s Information Group, for

instance, publishes collections of suppliers and producers in a number of military markets.

Civilian reuse potential of producers of military goods

At its core, conversion of military production capacities to production of civilian goods is an industrial structural adjustment. Civilian production has to be expanded and new civilian markets have to be found. In this respect, conversion is part of the ongoing process of industrial change.

Military specificity

The production of weapons hardware carries with it some specificity, which makes it different from civilian industries in similar circumstances and has an influence on reuse potential (Melman, 1974; Markusen 1986; Alic et al., 1992; BICC, 1998).

- **Secrecy requirements.** These lead to the compartmentalization of work and the separation of production activities.
- **Detailed project accounting.** Control over production and quality is pervasive. A heavy layer of bureaucracy is added to ensure secrecy.
- **Performance orientation.** Products generally are research- and technology-intensive and production batches small. Production is guided by requirements for the fulfillment of technical criteria
- **Cost negligence.** Production is funded at the level necessary to fulfill performance goals.
- **Marketing.** The monopsonistic nature of the market leads to specific kinds of marketing not well suited for selling on civilian markets.

Secrecy, performance orientation, cost negligence, and narrow markets together form a specific “defense industry culture” which is different from the situation in civilian industries. These differences are larger in some countries, such as the United States, than in others, such as Germany. Also, they are less important for companies already strongly engaged in civilian markets or producing dual-use goods (OTA, 1992; Kelley and Watkins, 1995). The “defense industry culture” has a number of elements that affect conversion efforts, including:

- **Organizational structure.** Defense production entities generally have larger research and development and administration departments than comparable civilian companies. Marketing departments are smaller.

- **Technical capabilities.** In general, defense producers have high levels of technological skills, often, however, in very specific fields of technology.
- **Cost structures.** Defense producers generally pay higher salaries, are used to purchasing higher quality materials, put more resources into quality control, and have undeveloped cost control procedures in comparison to civilian companies.
- **Mentalities.** Both for management and workers, resistance to change is typical. The government, as the dominant purchaser of weapons, is seen as responsible for maintaining capacities.

These factors contribute to making defense production downsizing a special case of industrial change.

Factors shaping reuse

Few production facilities are so specific that they can only produce weapons. In fact, from a purely technical point of view there are few limitations to transitioning defense production assets to civilian use. However, both theoretical analysis and practical experience show that this is only a precondition for economically efficient civilian reuse of production facilities. Analysis for industrialized countries, predominantly the United States, has demonstrated that the likelihood of commercial success of civilian reuse increases with the following conditions (Markusen and Yudken, 1992; Kelley and Watkins, 1995; Feldman, 1997, BICC, 1998):

- **Availability of advanced dual-use technologies.** This can give companies from the military sector a headstart in civilian markets.
- **Earlier exposure to and experience in civilian markets.** This makes it easier for producers to get away from a typical military company culture.
- **Capacity for long-term, risk-controlling civilian business planning.** This is a precondition for successful operation in civilian markets. Often military assignments are in two and three-year billets, thwarting long-term strategic planning.
- **Marketing capacity for civilian markets.** Marketing, including after-sales support and other post-production activity, is necessary in civilian markets, but unusual in military markets.
- **Capability of cost control and reduction of overhead costs.** Military producers are generally not competitive in civilian markets without major cost cutting.
- **Networking with external civilian advisors and cooperators.** It is ineffective to try to buy all the expertise needed for success in civilian markets.

- **Operation in growing markets.** Growing markets generally offer better chances for newcomers and companies in need of rapid sales growth.
- **Growth in civilian government procurement.** Because of some similarities in marketing, government markets are often easier to capture for companies focused on military production.
- **Availability of risk capital.** The transition costs money, both for investment in new company structures as well as for bridging low sales periods.
- **Assistance from economic development programs.** This can help to supplement external financing.
- **The complicated nature of military technology.** Military technology may change in quantum leaps, leaving defense producers a generation behind if they lack the resources to maintain aggressive research and development departments. Some less industrialized countries may also have had imported technological black boxes, leaving little technological learning to spur civilian product lines.

Conversion of production factors

Conversion of production capacities will rarely be complete. Rather, only some of the productive assets will be reused even in the best case. In searching for the reuse potential, it is important to look at the various levels of composition of productive assets:

- The **company**, as the highest managerial unit;
- The **plant or factory** within a company, as the primary unit of production;
- The **physical assets**, such as machinery, building, or land, constituting the factory;
- **Technologies and know-how** with dual-use applications or potential; and
- The **employees** of defense plants, as a group or individually.

Privatization

Privatization of arms production entities is generally the best option to ensure that rules of economic efficiency guide decision-making on the reuse of production facilities and production factors released from arms production. In some cases, investment in research and development or the organizational structure of an entity may be necessary in order to counter the initial disadvantages of arms production entities, which have been outlined above. In fact, privatization also has become the preferred mode of arms

production in a number of industrialized countries, such as the United States, the United Kingdom, and Germany. More countries are following this trend, such as Spain and Italy, which are privatizing their defense industries. Problems of monopoly situations, which are sometimes used as justifications to maintain state ownership, are better addressed through other policy measures, such as open competitions or, where security considerations call for domestic procurement, cost and price controls in acquisition. Arms production falls under the general definition of economic activities that can be privatized: “Setting aside terminology and its political and emotional overtones, one can venture that all activities that can be adequately described in contraction terms and whose performance can be measured can also be privatized.” (Guislain, 1997, p. 25)

Box 3: Conversion efforts at Denel, South Africa

DENEL Pty (Ltd) was established as a new state-owned industrial company under the Ministry of Public Enterprises in April 1992. It inherited most of the production and research facilities, and over 15,000 employees, of ARMSCOR, which had organized procurement and production of weapons for the South African armed forces in the past.

Since its formation in 1992, DENEL has been faced with a declining domestic defense market. It has also been confronted with an uncertain policy environment, given the post-Apartheid government’s commitment to the restructuring of state assets (privatization) and the lack of clear government policy with respect to the future of the domestic defense industry. In this context the company has pursued a number of adjustment strategies in order to “commercialize” the former ARMSCOR subsidiaries and to reduce its dependence on local defense sales.

All of DENEL’s divisions and subsidiaries have actively pursued strategies of diversification or partial conversion since 1992. Some divisions have pursued diversification through joint ventures or alliances with local and foreign civilian firms or through the purchase of existing civilian product lines. LIW, which manufactures small arms and artillery systems, embarked on a joint venture with a civilian company, BELL Pty (Ltd), to manufacture skid steer loaders. Somchem, which manufactures rocket systems, anti-armor weapons and missiles, has entered into a licensing agreement with Tubi Sarplast from Italy to manufacture glass-reinforced polyester pipes. Simera, which manufactures fixed and rotary wing military aircraft has a contract from Rolls Royce (United Kingdom) to build gearboxes for commercial aircraft engines.

Some of DENEL’s divisions have pursued diversification through spin-offs, by developing civilian products using existing defense technology and production facilities. This strategy of diversification has been accompanied by significant investments in R&D and new product development, as well as by a major marketing strategy to identify new—local and foreign—civilian markets. Kentron, which manufactures missiles and air defense systems, has developed new civilian products including traffic engineering systems, observation systems, and plastic and glass fiber products. Eloptro, which manufactures electro-optical equipment for military purposes, has developed civilian products such as glass molding equipment, and night vision equipment. Musgrave, which manufactures rifles and shotguns, has developed new civilian products including cricket bats and motor vehicle parts. Somchem has developed civilian chemical and composite material products using its defense technology and production facilities. PMP, which manufactures small- and medium-caliber ammunition, has developed a number of civilian products including brass and copper products, drill bits and pressed parts for the motor industry. Naschem, which manufactures medium- and heavy-caliber ammunition, has developed a number of civilian products for the mining industry, and a range of plastic products. Informatics, which is the major supplier of Information Technology (IT) products and services to the SANDF (South African National Defence Force), has become one of the largest players in the local commercial

IT market through equity partnerships (Information Database Technologies) and acquisitions of civilian IT companies such as AZ Computers.

Only one of DENEL's divisions, Houwteq, pursued a strategy of total conversion after 1992. Having previously been involved in military satellites and missile launch systems; the company began to pursue the development of low-earth orbit commercial satellites after 1992. During 1992 and 1993 the company developed a civilian observation satellite system and a resource management satellite system. However, neither domestic nor foreign investment capital was forthcoming, and the company's activities were terminated in October 1994. The failure of this conversion effort was partly related to political factors, particularly South Africa's efforts to become a member of the Missile Technology Control Regime (MTCR).

A number of internal and external factors have inhibited more success at DENEL, such as its traditional management culture, an initial very high dependency on defense, and high overhead costs, for instance from large research facilities. Also, South Africa's economy, as well as those of many of its major trading partners, was in recession. Further hurdles needed to be overcome, including the United Nations arms embargo (lifted in May 1994) and the absence of clear policies from the government.

The partial success of these conversion efforts has been reflected in the increasing value and share of DENEL's civilian business. In 1992, civilian sales—both domestic and export—contributed about 20 percent to DENEL's turnover. By 1995, civilian sales contributed about 30 percent to DENEL's turnover. In terms of value, civilian sales increased by nearly 40 percent in real terms between 1992 and 1995, while the value of defense sales declined by 20 percent in real terms during the same period. Employment, however, has been declining even more, partly through spin-offs of production capacity.

Sources: Batchelor, 1998; DENEL website at www.denel.co.za

Examples of civilian reuse

In an earlier assessment of industrial conversion, the World Bank expressed reluctance to offer support, stressing the practical difficulties of achieving a successful outcome rather than the absence of a mandate (World Bank, 1994, pp. 50–51). The practical difficulties of conversion have indeed proved to be considerable. However, there has also been successful, generally partial conversion using diversification or expansion of pre-existing civilian business activities in a large number of cases (BICC, 1998, ch. 4; for an example see Box 3). For the most part, success has had to do less with specific policies to assist conversion than with the general economic environment favoring market-based enterprise reform. Partial industrial conversion has been most successful in the United States and least successful in some countries in Eastern Europe.

Armed forces' business operations in civilian markets

Military business

In many countries, armed forces own businesses that operate in civilian markets. In some countries, for example Egypt, Indonesia, Thailand, Turkey, and several Latin American countries, these activities are extensive, both with respect to domestic

military expenditures (see below) and domestic economies. The term “military business” has become common for a range of the business activities of armed forces.

The primary goal of military businesses is to create income. However, the range of possible beneficiaries is wide, from the coffers of local units of the armed forces to pension funds. It is not unusual to find active duty or retired military personnel employed in military businesses. In fact, the provision of income for persons associated with the armed forces can be an important objective of military businesses. Another possible goal of military businesses is to control production in a sector seen as politically or economically strategic. In Argentina, for instance, the armed forces were a strong actor in steel production between the 1930s and the 1980s (Franko, 1996, see also Box 4). Some of the business activity of individuals within the military may be extra-legal. While not institutionally sanctioned, individuals may use their access to military power to appropriate resources, such as logging in Thailand, or to participate in narco-trafficking. These illegal or corrupt activities should be distinguished from the business interests officially tied to military institutions.

Box 4: Privatizing military businesses in Argentina

Privatization of the Argentine Defense Industry

The Argentine military sector at one time accounted for as much as 17% of gross national product. By the 1980s, its 39 establishments produced final military goods and intermediate products such as steel and petrochemicals. Civilian production supported strategic interests in the absence of private sector entrepreneurship. The directorate for defense industries, DGFM, therefore encompassed a complete productive process, with intermediate and final goods producers (Dorin, 1994, p. 29). Financially, the sector was a disaster, with losses over the 1980–87 period oscillating between \$187 and \$681 million (current) dollars per year. Over the period, with the exception of 1982, the total sum of the losses outran the total value produced by the firms. This means that the production in the sector was realized at the cost of decapitalizing the firms. The sector showing the best performance was petrochemicals, with positive profits in all years and no subsidies; the naval sector showed profits in all years but received subsidies. Overall, privatization was a prerequisite for economic stability.

The Argentine defense industry collapsed under the weight of its inefficiency. Privatization of the outer core of the industry—those firms less directly concerned with defense production—proceeded rather quickly. The World Bank provided \$300 million of financial assistance to facilitate the privatization, sale or liquidation of 24 of the largest enterprises under the control of the Ministry of Defense, including steel, petrochemical firms, and shipyards. Together these firms, representing 90% of the defense industry's employees, sales, and assets, accounted for one sixth of total borrowings from the government. Explaining the privatization method, Carlos Carvalho, then Undersecretary for Defense Production, said: "We work closely with the World Bank and once a company is considered reasonably ready to be transferred to the private sector, we choose an investment bank or financial agent to determine the best method for privatization." In the case of companies such as the large steel plant *Compania Mixta Siderurgica (SOMISA)* not ready to be sold immediately, said Carvalho, "We hire a consultant to get the company reorganized." (*Reuters Textline Institutional Investor*, Oct. 31, 1991).

A revision of defense policy was driven by draconian downsizing of defense budgets. Privatization of the defense industries paralleled a process of downsizing the Argentine military and a restructuring of the defense sector. The easiest firms to place in private hands were those not directly engaged in the production of defense products. Early on the Defense Ministry agreed to shed its holdings in companies where the initial objective of fostering industrial development had been achieved. These

included the steel companies SOMISA, Altos Homos Zapla and Forja Argentina, the Tandamor shipyards, and the petrochemical firms, such as Petroquímica General Mosconi, Petroquímica Bahía Blanca, Carboquímica and Petroquímica Río Tercero (*Reuters Textline Latin American Report: Southern Cone*, Jul. 4, 1991). SOMISA typified the critical state of some of the companies about to be privatized. By far the largest company under the jurisdiction of the Defense Ministry and one of the largest of its kind in Latin America, SOMISA's assets of \$2.1 billion were overshadowed by debts of \$800 million. Several factors contributed to SOMISA's problems, including high raw materials costs and an excessive number of workers (*Reuters Textline Institutional Investor*, Oct. 31, 1991).

The hardest privatizations, those involving the core of the military industry with little application to the civilian sector, were the toughest to accomplish. Their obsolete machinery and dismal financial position left little to attract national or international buyers. Some of the firms have indeed been closed, but a core of firms producing defense materials remains white elephants in the hands of the National Bank. The government ordered the closing of Hipasam, a state producer of iron ore and pellets managed by the Defense Ministry. The firm had posted losses since its creation in the 1970s, mostly because of low-quality output. The operation was subsidized by the nation's military regimes to reduce reliance on inputs from Brazil and Venezuela for steel production (*Business International Business Latin America*, Jan. 27, 1992). The new defense policy incorporates a very modest role for the residual firms in the defense industry.

Impossibly high costs forced Argentina's most modern shipbuilder out of business and saw the state ship repairer Tandamor (Talleres Navales Darsena Norte) handed over to the private sector. Legislation was changed to no longer dictate that Argentine owners buy their ships in domestic yards, and the merchant marine fund, which lost the import/export freight tax portion of its income, was dissolved (*Reuters Textline Lloyds List*, Nov. 16, 1991). President Menem signed the decree handing over Tandamor to a consortium led by the United Dutch Bank, owner Ciamar, and Sudmarine Enterprises. The price was US \$8m cash and debt bonds valued at US \$54.4m under a nine-year financing scheme. The new owners, who are obliged to retain the 700-strong workforce for at least a year, are expected to achieve an increase in occupation, production and investment after repairing and updating facilities (*Reuters Textline Lloyds List*, Nov. 16, 1991). The venture should succeed, given the favorable location of the facilities on the northern and southern access channels to Buenos Aires.

A key aspect of the privatization process was a 1995 contract giving the U.S. Lockheed Aircraft firm a concession of 25 years on the Córdoba Materiel Area (AMC). Lockheed will have an option for two 10-year extensions at the end of the first 25 year period. Lockheed will refurbish 18 of 36 Skyhawk Douglas A4-M planes that Argentina purchased from the United States with the balance refurbished in the United States. The agreement establishes that Lockheed will hire 2,070 former AMC workers, respecting salaries and seniority. Menem said the purpose of the agreement was to "reactivate the entire AMC, which will become a plane maintenance and repair center for the whole of Latin America," (*FBIS-LAT-94-242*, Dec. 16, 1994, p. 32).

Lockheed is currently only using approximately 1/3 of the enormous capacity of the Córdoba area, principally for maintenance and modernization of old Argentine Air Force equipment. As a private firm, Lockheed was able to accomplish what the government had difficulty doing: firing half the people to streamline production. The firm is moving the formerly military production facility into the civilian operations. Driven by these new ventures, it hopes to be able to re-hire more of these skilled workers. It may indeed over time branch out of the aircraft business into production of other transport equipment such as buses. Lockheed is hoping to use the position it garnered in acquiring the rights to the military production facility as a foothold for expansion of the civil-commercial base as economies stabilize in the Latin American region (Interview with Lockheed representative Ron Covais, Jun. 18, 1999).

The lessons of Argentine military privatization underscore the necessity of cutting losses and closing or liquidating unprofitable firms while engaging international capital as a source of investment to revitalize and modernize industries with civilian as well as military potential.

Sources: Frederico Nelson Dorin, "Industria de la Defensa en la Republica Argentina," CONICET Working Paper, June 1994; Reuters Textline Institutional Investor; Reuters Textline Latin American Report; Reuters Textline Lloyds List; Copyright 1992 Business International Business Latin America; FBIS-LAT-94-242, Dec. 16, 1994, first appearing on Buenos Aires Telam 14:52 GMT Dec. 15, 1994; Interview with Lockheed representative, Ron Covais.

Military practices of secrecy sometimes lead to low degrees of transparency and accountability over military businesses, which in turn open doors for personal embezzlement and corruption (World Bank, 1999). Widespread misuse of income from military business for personal gains in China was a major reason for the decision in March 1998 to command the PLA to dissociate from its business activities.

Military businesses can be found in all economic sectors. Historically, armed forces have been strong in sectors rendering services close to regular military activities, such as transport, logistics, meteorological, and geological services. Military businesses can also be found in construction and retail sales, as armed forces are able to supply large numbers of workers from their ranks. However, military business can also be found in sectors like mining with no relation to regular activities of armed forces. Especially for non-state, or irregular, armed forces the export of raw materials is an important source of income.

While it should be noted that military businesses could be found anywhere in an economy, examples of typical types of military business include:

- **Pension and insurance companies.** Armed forces, or members of armed forces, in a number of countries operate companies whose major goal is to invest in other productive assets.
- **Strategic industries.** The combination of a belief in the necessity to build-up and protect certain industries with a strong political position of the armed forces led to military involvement in basic industries, especially in Latin American countries.
- **Transportation, construction, and logistic services.** Often the same assets are used for the provision of military and civilian services, for instance in air and road transport. This allows a higher rate of use of these assets.

Military businesses often, although not always, use assets and personnel from the armed forces. That is one reason they in many cases enjoy commercial advantages over civilian competitors. Another is that they often enjoy direct privileges through administrative procedures.

Sources of information

There are no international comparative sources on military business activities. For some countries, such as China, there are case studies (Cheung, 1997). However, the available information on military business activities does not seem to be collected in a comparative perspective anywhere. A project with this goal has been begun at the Bonn International Center for Conversion (see under <http://www.bicc.de/milex>).

Asset transformation issues

There are good reasons to privatize military businesses. Military businesses often lack transparency, open the door for embezzlement and corruption, and are unfair competition for civilian companies. For precisely these reasons, strong political opposition against privatization can be expected at least in some countries.

Since these assets operate in civilian markets, there are no problems of transition or conversion as in the case of arms production enterprises. However, not all assets will remain available with privatization. In cases where assets are jointly used for the provision of civilian and military service, as in the case of airports, a decision will have to be made whether assets are transformed to civilian companies or kept under control of the armed forces.

Questions of transparency have been raised, not only in terms of armed forces versus civilian operations, but also among different factions of the armed forces. Changing access to assets within military institutions may change a delicate balance of power within the military itself. The transformation of military business into private businesses may require compensation for the armed forces or current and former members of armed forces. In China, the government directive to the armed forces to abandon military business activities will likely lead to an increase in budgeted military expenditures to allow the armed forces to continue to operate at the same level of income. Entitlements on pension funds need to be preserved.

Military equipment

The user specificity of military equipment generally is high, especially for weapons, but also for non-lethal equipment. The potential of productive reuse of military equipment that becomes surplus after the end of conflict, or because of military downsizing, is low and mostly confined to scrapping and reuse of materials. Certain weapons and ammunition present humanitarian dangers, and can hamper economic development, if they are not cleared.

Types of weapons and ammunition

A convenient distinction from the reuse perspective is between **heavy conventional** weapons, **light weapons**, and **ammunitions**, including **mines**. (Non-conventional weapons, such as biological, chemical, and nuclear weapons, which are widely banned under international law, are not considered here.)

- **Heavy conventional weapons** are weapons that are either stationary, have their own propulsion systems, or must be moved with transportation equipment. Typical heavy weapons are military aircraft, armored vehicles, artillery pieces, missiles for missile launch systems, and warships. Various definitions of heavy weapons, or similar categories, are used in the Conventional Armed Forces in Europe (CFE) Treaty (BICC, 1997), the United Nations Weapons Register (United Nations, 1993), and by research institutes such as for the arms trade data of the Stockholm International Peace Research Institute (SIPRI, 1998).
- **Light weapons** are person- and/or crew-portable (United Nations, 1997), with the first category often also called small arms. Typical small arms include rifles and hand grenades, while heavy machine guns need crews for transport. Small arms have increasingly become the object of international political activity, both at the national and international level (BICC, 1999; DiChiaro, 1998). They are in this respect similar to another type of small arms, landmines. With the entry into force of the Ottawa Convention in March 1999, anti-personnel landmines are banned internationally.
- **Ammunition**, for both heavy and light weapons, is separated here as a sub-category, both because of the special security problems that it presents and because of its reuse possibilities.

Other military equipment

Armed forces use various types of non-lethal equipment, for communication, transport, computing, etc. (Equipment attached to buildings, such as kitchens, and equipment for repair and production, is discussed below). Such military equipment often is non-specific to military use and user; however there are often economic characteristics that limit its civilian use. Relevant equipment includes:

- Computers and ancillary equipment;
- Earthmoving and other construction machinery;
- Radar and other surveillance equipment;
- Radio communication equipment;

- Transport aircraft (fixed-wing and helicopters); and
- Trucks and other land and sea transport vehicles.

Data on military equipment

Information on arsenals of heavy weapons is quite good—at least when compared with other military data. The most comprehensive source is the Institute for International Security Studies annual Military Balance (IISS, 1998). Additions to national arsenals through arms imports are tracked by the Stockholm International Peace Research Institute (SIPRI, 1998) and reported in the United Nations Conventional Weapons Register. Much information on the technical side can be found in various handbooks put out by the Jane's Information Group (JANE's, 1999).

There is less information available on light weapons, despite recent efforts to improve the information base. There are no data sources comparable to those on heavy weapons. Available information is collected at various web-sites of NGOs and there are some useful case studies (Miller, 1998). The United States Secretary of State, Madeleine Albright, has announced her support for a center to collect information on light weapons. The Swiss government is to fund a yearbook on small arms in preparation for a United Nations meeting on small arms in 2001.

Similarly, there is no comprehensive international data on other types of military equipment. Jane's Information Group, however, publishes handbooks which describe much of the technical characteristics of military equipment of all types, including non-lethal (JANE's, 1999).

Productive reuse potential of military equipment

Heavy weapons: The level of specificity of use and user of heavy weapons is high. There is limited civilian reuse potential. Some practical cases of productive civilian reuse include helicopters for search/rescue and police and transport work; light fighter aircraft for civilian flight training; landing ships for ferries; and armored vehicles as heavy transport vehicles, for fire fighting and earth-moving (BICC, 1997, pp. 76–77).

The scrap metal value of heavy weapons is low, with the exception of ships. But even with ships there is the serious problem of dangerous and poisonous material, including that found in metal alloys. There is generally no urgent need to scrap or otherwise eliminate heavy weapons.

Light weapons: The military specificity of use and user of light weapons also is high, though with some important exceptions. These include military-style automatic rifles, sub-machine guns, and hand grenades, which have proliferated in recent years during and after conflict from armed forces to civilians (Singh, 1995; Boutwell, Klare and Reed, 1995), leading to internal security problems. Small arms of these types have

become a major crime concern in many countries. An additional problem is that light weapons can circulate from one conflict to the next, destabilizing already volatile situations.

The safe storage or elimination of some types of light weapons, particularly mines, but also automatic rifles, sub-machine guns, and hand grenades, has become an urgent matter in many post-conflict situations. Explosive light weapons, such as mines, present additional physical security problems and their safe storage requires precautions. Once scattered, landmines become a serious obstacle to development. The clearance of landmines from land needed for productive use is increasingly on the agenda of donors, including the World Bank (World Bank, 1998).

Programs for the collection and elimination of other types of light weapons, which have become surplus after the end of wars or because of military downsizing, is lagging behind, though some practical programs have already been begun. The motivation for such programs is generally multi-fold: They are designed to reduce violence, the dangers of internal strife, and proliferation to other trouble spots, but also to improve the general climate for business and investment. The rationale behind this economic motivation is that domestic insecurity lowers, or even inhibits, productive investment. A low level of physical security will scare away potential investors, or, alternatively, increase the costs of their investments if they pay for private security measures.

Ammunition: All ammunition requires safe storage. Ammunition for automatic rifles and sub-machine guns present internal security problems similar to those of light weapons. High-caliber ammunition distributed in the field can present physical security problems similar to landmines.

Selected examples of reuse, scrapping, and elimination

Heavy weapons: There are very few reuse examples, such as tanks turned into bulldozers or ground attack fighter into jet trainers. More extensive reuse planned in the late 1980s and early 1990s by socialist countries in Eastern Europe, and allowed under the CFE Treaty, has not materialized. Although the treaty would have allowed for much higher numbers of the more than 56,000 heavy weapons that treaty member countries had to dispose of under the CFE Treaty, less than a thousand were converted for civilian use (BICC, 1997, p. 88). The main reason was that high operating costs, for instance for fuel and maintenance, outweighed lower investment costs when compared to dedicated civilian equipment (BICC, 1997, pp. 76–80).

The scrapping of heavy land weapons systems is costly and does not pay. The average cost for the destruction of more than 55,000 weapon systems regulated under the CFE Treaty in Europe (armored personnel carriers, artillery, tanks, fighter aircraft, attack helicopters, missile launchers) was about US \$4,000 per item (BICC, 1997, pp. 89–90).

The scrapping of ships, on the other hand, can be a profitable business. It is mostly performed in low labor-cost countries, such as India and Pakistan.

Environmental regulations in some countries, such as the United States, require scrapping in the country (see Box 5). The prices vary by the quality of steel, especially the content of hardeners such as nickel and beryllium. A scrapped ship may bring between \$100 to \$500 a ton in the international market. The USS Coral Sea, containing about 50,000 tons of steel fetched a price of US \$750,000 in 1995, although the owner claimed he would have been offered as much as \$9 million if he had been able to strip it in India. (American Metal Market, 1997, p. 7).

Light weapons: Demining remains a major challenge, despite recent successes in a good number of countries (United States Department of State, 1998; United Nations, 1999). Current methods of detecting and clearing landmines for humanitarian purposes are primitive, dangerous, slow, and costly. A metal detector and a hand-held probe are standard, although mechanical clearance methods adapted from the military, such as ploughs, flails, and rollers, may be used when funding and terrain permit. Even with precautions, clearing mines is dangerous work. One report estimates that mine clearers are seriously injured or killed at a rate of one per 1–2,000 mines cleared (Tsipis, 1996, p. 12). Even in Kuwait, under relatively favorable terrain conditions and with generous funding for the clearance contractors, there are reports that more personnel were killed clearing mines than the combat casualties suffered by the Coalition forces during the Gulf War.

Box 5: Scrapping of weapons

A wide variety of materials are used to produce weapons and at least some of these materials can be reclaimed economically through scrapping.

The most important material—in terms of quantity and economic value—is steel, predominantly from ships, but also from tanks and other vehicles. Many countries have a minor special industry for scrapping ships, naval as well as commercial. In addition, globally important centers of this industry are found on the coasts of several South Asia countries, as well as in South Korea.

Before scrapping, ships have to be demilitarized, that is, guns, missiles, missile tubes, and special electronics are dismantled and removed. Ships then need to be drained of oil, water and other liquids, and environmentally hazardous materials removed. This can be costly, if environmental regulations require special handling and disposal, as in the case of asbestos. Steel structures are stripped of fittings and other materials, many of which (such as wiring) can also be profitably recycled. Steel plates are detached, cut down into smaller pieces and then sold as raw steel to mills and foundries for the production of new steel.

In principle, similar procedures apply to tanks and other weapons with large steel content. Weapons are generally first demilitarized (often through the destruction of guns rather than by detaching them), stripped and then taken apart. Smaller items may be crushed instead of being disassembled and this can also apply to tanks. Generally, the ratio of recyclable material in total weight is lower in other weapons than in ships, making the scrapping of other weapons less attractive in commercial terms. Materials are mixed up to a greater extent and present major problems for purification, for example in the case of armored steel. The cost of stripping such weapons, including the handling of environmentally hazardous materials and the separating of steel armor-plating, often surpasses income from the sale of materials, especially if carried out in remote places with high transport costs. Non-recyclable materials have to be discarded in environmentally safe ways, which generally means that some have to be treated as toxic waste and this increases scrapping costs. Ammunition presents specific problems; safety

requirements, during both transport and disposal, are demanding, especially in the cases where old ammunition has become unstable.

Of course, in less industrialized countries, simpler methods can be used. In Somaliland, for example, demilitarized soldiers are making tools, such as plows, from the wreckage of war, including several hundred armored personnel carriers (APCs), tanks and anti-aircraft guns, within the framework of a project jointly sponsored by the International Rescue Committee and Sooyal, a veteran's group (*Associated Press Datastream International News Wire*, 7 April 1996).

Other materials recycled in large quantities from surplus weapons include:

- brass, mostly from ammunition cartridges
- copper, from wire and other electrical implements
- aluminum, from ammunition cartridges, ship superstructures, aircraft and vehicles
- titanium, from aircraft
- high temperature alloys from turbines
- nickel from valves, fittings and tubing

These materials generally fetch higher prices than raw steel, depending on the form in which they come out of the stripped-down weapon system and their purity/contamination with other substances, especially environmentally hazardous ones.

The process is also quite slow. In 1996, 3,000 workers cleared 12 square kilometers of Cambodia with currently available technology (Morrison and Tsipis, 1997, p.40). Demining is expensive and cost-ineffective, with costs of clearance out of proportion to the costs of the mines. The most common types of antipersonnel mines in use cost between \$3.00 and \$15.00, while clearing can cost between \$300–\$1,000 per mine (Joint Research Centre, 1995, p. 10). In 1993 U.N.-sponsored demining teams cleared 80,000 landmines at a cost of \$24 million, and the cost/clearance ratios have not improved. Clearing the 12 square kilometers of Cambodia cited above cost \$8 million. Improving detection and clearance methods is a formidable technical challenge. The humanitarian demining problem is characterized by an enormous variability in the nature of explosive ordnance to be removed, and in the type of terrain and vegetation. In addition, the mines are infesting some of the world's poorest countries, where the indigenous personnel available to undertake demining may lack technical skills and experience.

The main problem of other light weapons in post-conflict situations is to get them out of the hands of criminals and other non-licensed owners and under central governmental control. Many approaches have been tested to achieve this goal, although none has proved to be the final answer (Laurance, 1998). A mixture of voluntary and coercive programs seems to offer the best prospects; carefully designed incentives can improve the prospects of voluntary programs. Research has revealed a number of characteristics that enhance the chances of successful gun retrenchment, which has occurred in a number of countries (see Table 1). Light weapons destruction avoids the dangers of further circulation of light weapons, and destruction methods are simple (DeClercq, 1999). Recently, for example, in the collection of light weapons in Cambodia, the Cambodian Prime Minister climbed into a bulldozer to drive it over rows of old rifles lined up on the track of a sports stadium. (Reuters, 1999).

Ammunition: The disposal of ammunition via explosion in ammunition dumps is simple, though not without its local environmental hazards. More ecologically sound disposal requires investment in special furnaces. Disposal costs of ammunition are currently higher than the income from scrap metal. In a few very modern furnaces like the one at Steinbach, Germany, energy is produced from the incineration of ammunition (BICC, 1997, p. 80).

Table 1: Recent Weapons Destruction Profiles (selected list of countries)

Country	Magnitude (number of small arms collected)	Disposal	External Assistance
Albania	45,000	to be returned to Albanian armed forces and police control	Western European Union and UN
Angola	over 10,000 guns and 56 million rounds of ammunition to be destroyed or to be utilized by the new national armed forces	UN	
Bangladesh	weapons of 2,000 rebels to be collected	unknown	None
CAR	over 1,200 rifles	returned to army	ECOMOG
Chechnya	1,100	destroyed	OSCE
El Salvador	3,000 pistols and rifles, 2,000 grenades, 35 mines, over 80,000 rounds of a.	destroyed, verified by an independent third party	Canada, Luxembourg, Mexico, OAS
East Slovenia (Croatia)	over 8,000 rifles, over 13,000 grenades, over 1.7 million rounds of a.	partly destroyed, partly turned over to Croatia	UNTAES
Guatemala	Over 1,800 rifles, 2,500 grenades and missiles, over half a million rounds of a.	turned over to armed forces	UN
Haiti	33,000 weapons	turned over to armed forces, museums, to USA and destroyed	
Liberia	Almost 10,000 and 1.2 million rounds of a.	held by UNOMIL and ECOMOG, still undecided	ECOWAS and UN
Mali	over 2,500 small arms destroyed (burned)		UN, Canada, NL, Norway and USA
Mozambique	12,000 firearms, 8,000 grenades, 14,000 mines, over 124,000 rounds of a. destroyed		Sweden and USA
Nicaragua	142,000 destroyed		
Papua New Guinea	to be collected n.a.		Australia, New Zealand, Tonga and Vanuatu

Income to finance military operations

Sources of funds/entitlements

Defense budgets

Official defense budgets are normally the major source of income for regular armed forces. In many countries, official defense budgets are prepared on the basis of sound practices of budgeting and political decision-making. The requirements on which defense budgeting should rest are well captured in the principles of the IMF's Code of Good Practices on Fiscal Transparency (IMF, 1998a) and the accompanying draft manual on fiscal transparency (IMF, 1998b):

- Clarity of roles and responsibilities;
- Public availability of information;
- Open budget preparation, execution, and reporting; and
- Independent assurances of integrity.

The World Bank also has adopted a policy on military expenditures reflecting these basic requirements of transparency and accountability (World Bank, 1992). As the World Bank increasingly centered its attention on governance issues, questions of military spending as part of overall public expenditure issues began to surface (World Bank, 1994, p. 47–52). This study complements this literature in providing another way of thinking about the problem of the social valuation of a public good, defense, using a microeconomic approach.

The United Nations General Assembly has repeatedly adopted resolutions requesting that countries submit information on military expenditures within a standard reporting instrument and has solidified, through a number of studies, the basis for proper reporting of military expenditures.

The principles of defense budgeting that emerge from this international consensus on military expenditures include:

- **Completeness:** Numbers reported should include all core activities related to the operation of armed forces. Internationally accepted definitions differ with respect to the extent of inclusion of non-core items, such as paramilitary forces, and related items, such as pension payments and civil defense expenditures (Brzoska, 1995).
- **Transparency:** Numbers reported should be truthfully corresponding to an internationally acceptable definition of military expenditures. Breakdowns of major categories of military expenditures should be provided which allow some additional

insight into the financial operation of armed forces. The roughest such breakdown is between personnel expenditures, other operational expenditures, procurement of weapons and other military expenditures, and infrastructure construction and maintenance. The United Nations requires a much more detailed breakdown, including by types of armed forces (Army, Navy, Air Force, etc.).

- **Accountability:** The decision-making process over the size and composition of the defense budget should reflect some minimum standards of procedural openness. There also should be ex-post accounting of planned expenditures.
- **Efficiency:** Military spending should be efficient with respect to the planned results. Proper procedures, transparency, and accountability should help to stop inefficient use of funds, including corruption (World Bank, 1999). Some donor countries, such as the United Kingdom, have offered to help countries improve oversight over defense budgeting (Elliott, 1998; Ball, 1998a). The World Bank has earlier offered its support to work with borrowing countries to analyze the impact of military expenditures with a view to reducing them to the extent feasible. It warns, however, that it could not judge the appropriateness of individual spending categories (World Bank, 1994, p. 49).

While great strides have been made towards an internationally agreed framework on military budgets, practice has not changed as rapidly in some parts of the world. For instance, reporting within the UN framework has not improved in the 1990s. Some governments continue to regard military expenditures as a matter for secrecy, while others have found it too burdensome to respond to international requests for transparency and accountability. There are also some indications that the importance of income of armed forces other than that from regular military budgets may have increased in the 1990s. The Chinese case illustrates a deal between the army and the government that permitted extra-budgetary fundraising when the central budget was constrained to rise no faster than the rate of inflation. Most recently, the Army has been asked to divest itself of these businesses as issues of transparency were raised. To contend with the Russian financial crisis, side activities of the military there have reportedly also increased.

Other government funds

One type of such non-defense budget income is funding from state and central governments. Despite the wide acceptance of international definitions of military expenditures, governments exercise much freedom in budgeting defense-related items under budget categories other than defense. This ranges from special accounts for procurement to funding military education facilities from education budgets. Especially in countries in conflict, the distinction between defense budgets and other budgets can tend to become blurred.

Other institutionalized sources of funds

In some countries, armed forces are entitled to non-budgeted incomes, such as the sale of natural resources. In the case of copper from Chile the military are entitled to 10% of sales for arms purchases. Armed forces, or units of armed forces, may also be entitled to keep proceeds from the sale of used weapons and other property in special funds.

Opposition and other irregular forces will often rely on income that is regular, and in a way institutionalized, but does not run through government coffers. They can levy tax-like duties on the exploitation of natural resources, and/or the production and sale of goods and services, they can collect income at roadblocks, and more or less voluntary contributions from supporters, in the country where they operate and from outside of it. Probably the most important source of income of irregular forces in the 1990s has been the sale of exploitation rights for natural resources under their territorial control, such as diamonds in West Africa and tropical forest products in Cambodia. There is also a strong link between territorial control of irregular forces and production of narcotics or their pre-products. The link between guerilla activity and counter-narcotics continues, for example, to fuel the crisis in Colombia.

External funds/military aid

During the Cold War, military aid from foreign governments was an important funding source for both regular and irregular military forces. Military aid was mostly given in the form of weapon systems, but also in cash (Brzoska, 1992). International budget reporting requirements stipulate that military aid should be reported in the donor's budget, and as general income. The importance of military aid to regular forces began to decline in the 1980s and has continued to do so, particularly because of the demise of the Soviet Union, which gave away large weapon arsenals as military aid (Brzoska, 1995).

It is much more difficult to assess military aid from foreign governments to irregular forces, as very often the extent of such aid is kept secret. Judging from reports on supply lines and financing of recent wars, it seems this type of funding also has decreased with the end of the Cold War (Ploughshares, 1998; Wallenstein and Sollenberg, 1998).

On the other hand, another type of foreign support has gained in importance in the 1980s and 1990s: remittances. Financial support from the expatriate community to irregular forces has been an important source of income for them in some internal wars, such as in Sri Lanka and Kosovo.

Income from military-run business/pension funds

Another important source of funds for the operation of armed forces in many countries is military business activities. While good practices of accounting require reporting on such activities in budget documents and subjecting extra-budgetary activities to government review and priority setting (IMF, 1998b, p. 18), this is often

not the case. In China, at least until the government ordered the People's Liberation Army to devolve its business activities in 1998, military units of all levels conducted business activities for direct gain without much central government control (Cheung, 1997).

One well-established form of military involvement in business activities is mutual funds to which officers and soldiers contribute, such as military foundations and pension funds, for instance in Pakistan and Turkey (see below). Income for such funds can be used in financing activities of active military forces. More common, however, is the provision of pensions to former military personnel. Pension funds may also support the provision of social services, such as the case of the military hospital system in Jordan. It should be clearly understood that these services make play an important role as a social safety net and, if transferred to the private sector, must be replaced or replicated to maintain social welfare.

Sources of information

Not least because of differences in definitions and the practical difficulties of marking the borders of relevant activities, information on military expenditures is not very reliable. National data generally needs to be scrutinized diligently in order to ascertain what it does and does not cover (Ball, 1984a, 1984b). International data, while generally more in line with common definitions, remains frustratingly unreliable. Despite some efforts to improve reporting, large differences exist among major sources (Brzoska, 1981; Happe and Wakeman, 1994, Lebovic, 1998), as well as within sources where sources report changes in subsequent editions (Lebovic, 1999).

Standard sources that publicly report on global military expenditures over longer periods of time include:

- International Monetary Fund's *Government Finance Statistic Yearbook* (national data that corresponds to an IMF definition). The IMF maintains another confidential data set; however, the data is analyzed and presented in aggregate form annually in the *World Economic Outlook*.
- United Nations Military Expenditure Reporting Exercise (national data that corresponds to a United Nations definition)
- International Institute of Strategic Studies' *Military Balance* (reports national budget plan data)
- United States Arms Control and Disarmament Agency's *World Military Expenditures and Arms Transfers* (reporting data collected by U.S. government agencies based on a definition similar to the United Nations')

- Stockholm International Peace Research Institute's *Yearbook on World Armaments, Disarmament and Security* (reporting data drawn from multiple sources based on a NATO definition of military expenditures).

In addition to these standard public sources, specialized reports exist. Some organizations, such as NATO and the OSCE collect data of member countries. NATO publishes some of this data, including on its website, while OSCE data is confidential. The data from these sources is sometimes also published in other formats. For instance, the US government puts out reports on military spending based on the same data sources as the ACDA report, and the UNDP's *Human Development Report* uses SIPRI data.

Standard sources differ for a number of reasons, including definitions, methods to account for the differences in fiscal and calendar years, currency conversion, and deflation (Brzoska, 1995). Coverage ranges from a few dozen countries in the UN military expenditure exercise to a nearly complete set published by U.S. ACDA.

Standard sources generally only report single numbers for total military expenditures. Detailed breakdowns are required by the UN military expenditure report format; however, few countries comply. Ball (1984a) has demonstrated that, at least for a large number of countries it is possible to construct detailed data from national sources. However, no reporting organization has invested the amount of work and expertise needed for such an effort on a continuous basis. The work conducted by Cepal (The Economic Commission in Latin America and the Caribbean) is an encouraging example of new efforts at regional standardization and transparency of military reporting.

Scope of a "peace dividend"

Reductions of military expenditures after the end of conflict open the prospect of additional financial means for civilian sectors, either through reduced financial burdens on civilian sectors or reallocations of expenditures for civilian purposes. Although much evidence suggests that reductions in military expenditures have had beneficial effects on civilian economies, identifying cause and effect is complicated, particularly in post-conflict situations.

Conceptual considerations

Often, analysis of economically beneficial effects of reduced military expenditures is concentrated on the perceived "savings" from reduced budget allocations. For instance, the UNDP's Human Development Report portrayed the (growing) gap between military expenditures using the reference year 1987, when they had been at a global high, and current military expenditures as the "peace dividend." If another base year had been chosen the dividend would have shrunk. In other work, the peace dividend is identified as the (positive) relationship between reductions in military expenditures and increases measurable macroeconomic aggregates, such GNP (Gleditsch et al, 1996).

Problems of causality plague these studies. Chan has suggested that it makes sense to think in terms of steps in a “peace dividend” process or of various “peace dividends” (Chan, 1995; BICC, 1996). He has proposed dividing analysis into three parts. The savings resulting from reduced military spending is called the *resource dividend*. The sum of the various alternative uses to which the savings are allocated, such as increases in civilian governmental spending and reductions in military outlays is called the *product dividend*. The final outcome, which depends on both how the savings are spent and how it is transmitted in an economy, is called the *welfare dividend*. While such a comprehensive view of the effects of reduced military expenditures is conceptually neat, it is very difficult to implement in practice (Brömmelhörster, 1999). Estimating the size of the reduction as well as the gains is a difficult process.

Various models have been proposed to capture the peace dividend process in a simplified way. The most prominent have come from the IMF. Based on assumption of high productivity of civilian investment versus zero growth impact of military expenditures they result in high and growing effects of reductions in military expenditures on economic growth. Transmission mechanisms are reduced interest rates and increasing capital investment (Knight, Loayza, and Villanueva, 1995; Bayoumi, Hewitt, and Symanski, 1996). Models where the links among interests, investments, and growth are less direct and which also take account of changes in demand, such as the United Nation’s LINK model, produce substantially lower, but still positive, effects on GDP. If military expenditure results in reduced demand there can even be an initial period of negative growth (United Nations, 1995; Li and Pauly, 1996).

Impediments to alternative resource use

Models and empirical investigations of the type described above are by nature simplifications and seldom take into account a number of factors which have, in practice, often limited the effects of military expenditure reductions. These include:

- **General income reduction:** Decreases in military expenditures often occur in the wake of general economic collapse. Striking examples are some of the former socialist countries in Eastern and Central Europe. General income contraction also is a feature in post-conflict situations.
- **Defense-specific reasons:** There are also more defense-specific reasons why reductions in military expenditures may not free concurrent levels of resources for alternative expenditures or reductions in government incomes in post-conflict situations. Some of the funds used for the financing of military operations, such as foreign aid, or contributions from expatriates, may dry up post-conflict. Similarly, armed forces may have to return entitlements, such as the income from the exploitation of natural resources, which they were only allowed to pocket during a conflict.
- **Disarmament spending:** Reductions in military expenditures in general create costs. Some of these costs are discussed elsewhere in this report, such as the

disposal and destruction of weaponry, or the initial costs of demobilization and reintegration programs. These costs can at least be partly recovered through income that flows in later. Other costs, such as pensions, are fully sunk. The direct costs of disarmament differ from case to case, depending on a number of factors. The assessment of whether they have an effect on the “peace dividend” is also dependent on whether they are budgeted within defense budgets or put under civilian budgets.

The analysis of disarmament costs versus later benefits from disarmament has led a group of economists authoring a study for the UN Institute for Disarmament to posit disarmament as a process that needs investment (UNIDIR, 1992). In their view, early costs, lag structures of resources reuse, and cumulative income creation processes combine to a sequence of “pay now, benefit later.”

Empirical evidence

Post-cold war reductions in military expenditures have led to both reallocations of expenditures to civilian categories as well as reductions in government income, which also lower public (United Nations, 1995). While especially in Central and Eastern Europe economies contracted in parallel to military expenditures, this was overcompensated on a global scale. As measured by the IMF, the share of military expenditures in global GNP shrank from 5.2% in 1985 to 2.3% in 1996 (IMF, 1997, p. 147). Empirical investigations of the link between reduced military expenditures and macro-economic aggregates have to cope with a host of measurement and modeling problems. These have also plagued the large general literature of the effects of military expenditures on macro-economic aggregates such as GDP growth. Testing is quite sensitive to the approach used (Hewitt, 1993) and data, as outlined above, is often unreliable. In a recent overview of empirical work, Dunne concluded “while there is no clear consensus on the economic effects of military spending, the most common finding is that military burden has either no significant effect, or a negative effect on economic growth ...This means that there is the potential for developing countries to cut military spending with, at worst, no harm to economic performance and, at best, higher economic growth” (Dunne 1996, pp. 456–457). Our report provides a micro-economic analysis of the possibilities for sectoral reform that complements these macro-economic approaches. Understanding and managing the process of reallocation of resources at the micro-economic level may indeed facilitate gains in specific geographical areas.

Efficiency savings

Reductions in military expenditures can also be brought about through increases in the efficiency of the use of funds. Military sectors are sometimes judged less efficient than other sectors, because of the cultures of secrecy, hierarchy, and bureaucracy (Hartley and Sandler, 1995a). Increased efficiency through greater attention to costs, reduction of bureaucracy, and the introduction of new management techniques can help reduce

military burdens in many countries. But it is in post-conflict situations more than any other that there is a chance to increase efficiency. Interests and bureaucracies are less entrenched and procedures less well established. Drives for more efficiency in post-conflict situations make most sense if they are combined with military reform in a wider sense. This should include a restructuring of the strategic framework to reflect new national and international objectives.

Post-conflict asset transformation

Armed forces aim to optimize asset acquisition and use in military sectors as described in the first section of this report. As was repeatedly pointed out in the above discussion, military assets can lose their value, or can become liabilities, when they are not wanted any more by armed forces and become available for asset transformation. Not all assets can make a contribution to economic and social development or facilitate the transition to sustainable peace after hostilities have ceased. While some general considerations about the possibilities of asset transformation were made in section two of this report, specific assessments are needed in particular circumstances. These would involve in-depth country studies analyzing opportunities and constraints in redeployment of national military assets.

In addition to such technical factors of asset valuation, other, broader issues need to be considered for successful asset transformation. These include questions of actual ownership of assets, retention and upgrading of assets by security forces, and the sequencing of asset transformation.

Asset revaluation

A number of factors influence the value of military assets that become available for civilian use. They cover physical features of assets, as well as the preferences of potential civilian users and costs of transforming assets:

- **Civilian usability of assets/fungibility of entitlements:** Not all assets have civilian uses. On the other hand, money saved from government military expenditures is immediately available for civilian purposes. These savings may come from eliminating operating costs such as fuel and labor.
- **Physical status of assets:** In addition to age and use, different standards of asset use, for instance with respect to environmental treatment of land, may reduce the value of transformed assets.
- **Civilian demand for transformed assets:** Effective demand for transformed assets may be low, for instance because of consumer preferences or general slack in economic activity.

- **Investment cost of asset transformation:** Few assets can be used as they were in military sectors. As noted earlier with respect to specific types of assets, investment is generally necessary before civilian use.
- **Asset degradation:** In addition to normal asset degradation over time, unplanned civilian seizure of assets may quickly degrade the value of some types of assets, such as buildings on military land and military factories. Looting or stripping complementary assets such as machines can cause a rapid loss of value.

Ownership issues

Military asset transformation can be plagued by ownership questions. It is often not clear who has authority over reuse decision-making, which institution needs to make necessary investments before civilian reuse, which institution is entitled to receive income from civilian asset reuse, or who is entitled for compensation. The financial mechanisms for transfer of assets are often unclear, complicating later access to funds.

Civilian/military asset ownership problems

Ownership over military assets can span a wide spectrum of institutions and individuals. Sometimes arrangements are overlapping or unclear with respect to who is the owner of military assets immediately after the decision has been made to release them for civilian use. In principle, various types of ownership including civilian government, military, and private can be distinguished. In practice, however, there is often disagreement over the legal rights of the owner. Typical disagreements can be found at:

- **Levels of government:** While in general it may be assumed that publicly owned military assets are under the control of central governments, problems can arise with respect to regional governments or communes, especially where these have strong roles in economic development and planning (see below). For instance with respect to military land, conflicts over pricing between central authorities interested in maximizing immediate income and local authorities interested in maximizing longer term economic development occur.
- **Civilian government agencies versus central armed forces/defense organizations:** Armed forces or, where applicable, defense ministries sometimes consider themselves as owners of military assets which have high civilian values. As owners, they consider it their right to receive the income from the sale of such assets, or require compensation from civilian sources. On the other hand, civilian government authorities may require that armed forces retain asset ownership over a period of time before release in order to improve the civilian usability of such

assets. One pertinent example is environmental cleanup before the release of land for civilian use.

- **Central military institutions versus regional units of armed forces/irregular forces:** In some cases, including post-conflict situations, regional military units and irregular forces may be the owners of assets prior to transformation and require some form of compensation for the transfer of their assets. Typical examples come from the realm of military businesses.
- **Individuals in armed forces versus civilian private individuals:** Military sectors are, even where they are similar to economic enterprises, under strong military control. Sometimes it is unclear whether supposedly private individuals are not in fact acting for the armed forces, or units of armed forces, or vice versa. Especially with respect to military business, but also arms production enterprises, the entanglement of private and public ownership at the time of asset transformation can be difficult.
- **Foreign ownership:** There are specific problems presented by foreign ownership over military assets. Where foreign ownership is based on international treaties or agreements, problems are mostly of a practical nature, such as who pays for environmental cleanup and what value is given to superstructures built by foreign forces. In the cases of closures of foreign bases in Europe, East and West, the agreement has usually been to simply assume that cleanup costs and additional value from investment into superstructure cancel each other out and bases were transferred without compensation for either side (Cunningham and Klemmer, 1995, 1997).

Unclear ownership can impede or slow down civilian asset reuse, both where it entitles the owner to income or compensation and where it induces costs.

Decision-making over post-conflict asset transformation

A closely related issue, which can also contribute to slow asset transformation, is authority of decision-making. Decisions to be made include the decision to release assets from military use, as well as the type and form of reuse. In addition to ownership of assets at the time of transfer to civilian use, other obstacles to asset transformation can arise because of unclear or competitive roles of the various levels of actors involved:

- **Planning and implementation authority:** Planning and implementation may not be under the control of the institution that owns the military assets available for transfer. For instance, regional economic development may be under the control of regional government authorities, while military land to be transformed is owned by central government.

- **Financing of investment prior to resource use:** Financing institutions, whether government or private banks, have an important role where assets require investment prior to civilian use. Special problems can arise in cases where planning and financing is strongly influenced by external donors. Donors have to be careful to insure that their objectives are commensurate with those of targeted recipients.
- **Incidence of benefits:** Benefits of asset transformation will often be local or limited to certain sectors of an economy or society. Clashes of interests over asset reuse are not infrequent and need to be solved by legitimate institutions.

Privatization

Privatization of assets coming out of military sectors can often simplify institutional problems. It is also the probative means to ensure that asset reuse makes economic sense. However, public financial support may be necessary for investment prior to civilian reuse in cases where asset reuse could not be otherwise expected to occur, or where public authorities have objectives in addition to economic ones, such as with respect to internal security.

Security sector reform

Military asset transformation is also related to the issue of security sector reform (Ball, 1998a). Downsizing of military sectors—the precondition for asset transformation—remains a haphazard and incomplete measure if it is not connected with an overhaul of the armed forces and their role in society, including civilian political oversight, civilian accountability, functions of various types of armed forces, their doctrines, structures, and practical setup. Not all of these issues, however, can be dealt with in this report, which is focused on aspect on military asset transformation. Bilateral donors have been engaged in efforts to restructure security forces in post-conflict situations. This involves a complicated, long-term process that engages civilians often undertrained in military affairs in a dialogue with military organizations to determine national objectives and the appropriate military instruments to achieve them.

Reorganization of security sectors

Post-conflict situations are generally characterized by a desire and need to downsize available armed forces. In cases of cease-fires among several armed forces, this may be preceded by a period of unification of these forces and an initial increase in the number of official government forces, though not the actual number of people under arms. In addition to downsizing, armed forces often need to be changed in their orientation, which during conflict was to fight a war. Major elements include:

- **Strengthening of civilian control:** This includes civilian command on the highest level and accountability to parliaments, as well as monitoring of the armed forces and their activities by civil society in general.
- Orientation of military doctrines toward peace, arms control, and regional or sub-regional security.
- **Democratization of armed forces:** This includes the clear establishment of rights and duties for individual members of armed forces to ensure respect for human rights and international law.
- **Separation of functions:** A major element in security sector reform in post-conflict situations generally concerns an overhaul of structure in response to a stricter division of responsibilities. Thus an important regular element is the separation of police functions, including maintenance of internal security and order, from those of the armed forces responsible for external defense and international security concerns.

Asset and human resource reuse in security sector reform

The build-up, or massive overhaul, of police forces at the expense of military-style forces is often the centerpiece of security sector reform in post-conflict situations where criminality and internal security become major concerns as wars fought by military forces end. Quite frequently in the past, newly-established or reformed police forces have made extensive use of former military personnel, former military barracks, weapons, vehicles, and other assets. While this approach is often expedient for cost reasons because it allows a speedy build-up of police forces, it has run into problems in the past (Oakley et al, 1998; Call, 1998; Neild, 1998). Military training is quite different from that for police forces and military weapons different from what police should use.

Political economy of military asset transformation

It would be naive, as was pointed out in the first section of this report, to view decision-making over any aspect related to armed forces as purely economic. Armed forces can be seen to operate like economic entities, but their objectives, functions, and roles are highly political. In this final section of the report, a few of the non-economic elements influencing military asset transformation will be briefly discussed.

Interests and actors

The decline in military asset use, as the origin of the possibility for civilian asset reuse, will in practice generally be paralleled by a decline in the political importance of armed

forces. Military reform similarly assumes, and actively promotes, a reduction in the political role of armed forces. This may be resisted by armed forces. Specifically, the importance of armed forces in conflict may also give them a strong political position after the end of conflict to resist their downsizing and reform.

Under such conditions, a mismatch may occur between assets under military control and real needs of the armed forces. Fewer resources and assets may be released than would be feasible and beneficial for sustainable peace and economic and social development.

More generally, the political balance between armed forces and civilian authorities, as well as the relative strengths of actors within armed forces and governments, will strongly influence decision-making over which military assets will be released and how they can be reused. The decision-making may therefore be sub-optimal from the point of view of fostering economic and social development. One of the objectives of military reform is to increase the rationality of such decision-making through greater civilian democratic control and accountability. The success of asset transformation is to some extent dependent on such rational decision-making. While this project does not make any judgments about optimal force sizes, it is worthwhile to underscore the win-win opportunities for the military if downsizing is accompanied by modernization. As took place in the Philippines, some percentage of resources released in land sales, for example, was retained by the military to meet new security challenges: radar surveillance of airspace and coastal patrol of the Exclusive Economic Zone to prevent overfishing.

Sequencing

On the other hand, limited civilian absorptive capacity may also influence decision-making over the release of military assets for civilian reuse. A large-scale demobilization or sale of military land may lead to economic disruption instead of contributing to economic and social development through a more gradual release of military assets. The economically optimal sequences of military asset transformation may not always be possible because of the political wish to downsize armed forces faster, or the interest of the armed forces to rid themselves of assets. Intermediate steps are sometimes possible, such as by establishing development corps as Namibia and Eritrea have done. Ex-combatants have been kept under military command but given a clearly civilian task, such as building roads. An internal assessment of the absorptive capacity of the civilian economy is critical to the efficient redeployment of defense assets.

Assets and liabilities

Clearly not all items considered assets for armed forces are assets for civilian societies and economies. Weapons, in most cases, are considered peacetime liabilities as they contribute to an increase in violence and crime. These liabilities must be dealt with for political, environmental and security reasons. If nothing is done with weapons, as with

other military liabilities, they can become detrimental to sustainable peace and economic and political development in the longer term. The case of incomplete demobilization is instructive: If ex-combatants are not properly disarmed and re-integrated and armories are not well protected, internal security problems may arise. Weapons might remain or fall in the hands of ex-combatants or enter criminal and gray markets. The availability of these “uncontrolled” light weapons causes dangers at different levels. It increases the risk that disputes between individuals are settled with deadly violence, since most ex-combatants have learned little else beyond violence to solve problems. These weapons could also fuel banditry, and political groups could more easily arm themselves and disturb democratic political processes and hamper economic growth. An additional threat to security after demobilization is caused by ex-combatants trying to apply their military skills elsewhere. The use of ex-soldiers as mercenaries in official and private armies is increasing. Many of them originate from armies that have recently been downsized, leaving ex-combatants without good sources of income.

The distinction between assets and liabilities can become blurred if other than immediate economic considerations are taken into account. Land contaminated with ammunition, for instance, needs to be cleared for security reasons; once that has been done, its value has increased. If a government decides not to invest in cleanup, problems will likely arise down the line. More generally, governments have to make decisions on military assets not only in the light of the contribution to economic and social development, but also their political, environmental and internal security aspects.

Summarizing possibilities and problems of military asset transformation

Armed forces, and the military sectors supporting them, need resources and assets, in a wide sense, to be able to perform the functions for which they have been created, not unlike economic enterprises. While the ways in which assets are used and combined are specific to armed forces, many of them can also be transferred to civilian uses. Such transfers provide economic benefits and can thus make a direct contribution to economic development. The most fungible resource in military sectors is their financial entitlements, especially the regular military expenditures (see Table 2).

However, the transformation of military assets to civilian use will often require initial investment, as military assets are not directly adapted to civilian uses. Investment in asset restructuring today may promote long term gains. Military land provides a good example for such type of asset. Land often needs to be decontaminated before it can be put to civilian use.

In addition to such direct economic calculations, other considerations are relevant in the context of thinking about the transformation of military assets. These concern the framework of economic development: One important consideration, put up front in the World Bank's thinking on post-conflict is to sustain peace. Lasting peace is a goal in itself as well as a precondition for investment, building of social capital, and

economic development. A reduction of armed forces through demobilization and successful reintegration of former combatants may help to sustain peace.

Another factor inhibiting investment and the building of social capital can be crime. Demobilization and reintegration, as well as a reduction in the circulation of illegal small arms, can help reduce the detrimental effect of crime.

A third relevant factor fostering economic development is good governance, which has received much attention by the World Bank, and, with special emphasis on transparency and accountability, by the IMF. Military sectors are by nature secretive, and there are good reasons to be secretive about some elements of it. However, secrecy requirements have to be balanced with the basic requirements of governance, as well as those of efficiency of asset use in the military sector. For instance, military expenditures need to be known so that rational choices can be made by the proper institutions about the balance with civilian expenditures.

Another factor is corruption, which has also been put strongly on the World Bank's agenda. Secrecy as well as certain privileges within military sectors can reduce the restraints on corruption. Transformation of military business through privatization can help address this problem.

The detailed discussion of various types of military assets in this report aims to assess the potential and challenges of military asset transformation. This assessment is summarized in Table 2. The six types of assets, in a broad sense, discussed in this report are further subdivided into categories. Military sectors do not only contain assets in the narrow sense, nor is civilian reuse confined to financial entitlements such as military expenditures. There is a broad range of resources, assets, and entitlements that may become available when a decision to downsize military sectors has been made.

Of course, not all of the assets discussed in this report have relevance for all countries. In fact, in quite a large number of countries military sectors do not consist of much more than soldiers carrying small arms and financing comes from non-fungible sources. In such cases, the opportunities and challenges of reuse are limited to demobilization and reintegration, and perhaps a need to address the dangers of illegal small arms. In other countries, however, the full spectrum of assets discussed here may be relevant. This is a matter that has to be established country-by-country for which some sources of information are suggested in this report. However, as stated earlier, any in-depth analyses, as well as actual transformation of military assets, will require the cooperation of the country concerned.

The reuse potential is summarized in Table 2 in two broad categories by tagging effects that successful transformation of military assets can have for economic development and sustainable peace and the difficulties for economic development and sustainable peace which can result from a lack of attention to such military assets.

This report does not discuss in full detail the urgency needed to deal with the various types of military assets in post-conflict situations, nor the issues of timing and sequencing. The purpose of this report as a typology of military assets is more limited. Still, it contains some conclusions with respect to these issues. Thus, the element of military asset transformation with which the World Bank has most experience so far, demobilization and reintegration, seems to be both the most time-urgent task as well as

the immediately rewarding one in post-conflict situations. Military land has potential where the armed forces own land and infrastructure that has promising commercial values. The conversion of arms production enterprises has more limited prospects and can often best be dealt with in a broader framework of industrial restructuring. Military business in civilian markets, while of great importance in a number of countries, can present particularly difficult political problems, which require strong attention to proper sequencing within the process of a broader change in civil-military relations. The reallocation of military funds and entitlements often occurs in situations of general fiscal stringency and goes almost unnoticed. This is unfortunate if the effects of downsizing of military expenditures on other elements of the military sector go unnoticed. The more optimal approach obviously is to combine downsizing with a thorough security sector reform.

The report also discusses practical aspects of defense assets transformation with respect to the various types of military assets (see also Table 2). It cannot do justice to the rich details that come out of analysis of country cases of military asset transformation and need to be considered when planning such activities. Some more detail is provided in prior sections of this report; however, as a typology of military assets it does not aim to provide more than a structure for planning practical asset transformation.

This report also does not spell out what would be proper or useful for the World Bank, or other donors, to pursue with respect to the transformation of military assets. It suggests opportunities and challenges that address the whole spectrum of actors. Military sectors, while they can be and should be viewed as economic entities, are part of the political core of nations. Decision/making about military asset transformation therefore requires a national preparedness to downsize military sectors. Good arguments about the benefits of military asset transformation for economic development and sustainable peace, as well as the prospect of help from donors such as the World Bank, may, however, foster such preparedness.

Table 2: Typology of military assets

Type of military assets/resources/Entitlements/	Categories	Reuse potential	Reuse challenges
Human resources: former soldiers and ex-combatants	<p>Groups of demobilized may be distinguished with respect to a number of criteria, including:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Education/Qualifications (before/during/after service) <input type="checkbox"/> Entitlements (to land, other productive assets) <input type="checkbox"/> Social integration (in origination communities, new communities) <input type="checkbox"/> Personal characteristics (age, aspirations etc) <input type="checkbox"/> Specific problems (handicapped, child soldiers, sicknesses) 	<ul style="list-style-type: none"> <input type="checkbox"/> Addition to civilian labor force <input type="checkbox"/> Productive activity <input type="checkbox"/> Contribution to rebuilding social capital <p>Unemployment problems in situation of labor surplus Political and security problems in cases of insufficient reintegration</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Demobilization <input type="checkbox"/> Reinsertion <input type="checkbox"/> Retraining <input type="checkbox"/> Providing opportunities for productive work <input type="checkbox"/> Social nets for specifically disadvantaged troops
Military land	<p>Different types of military land use with respect to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Superstructures (buildings, infrastructure) <input type="checkbox"/> Location (close to cities, far from centers) <input type="checkbox"/> Condition (contamination, age of superstructures) <input type="checkbox"/> Use (airports, ports, training ranges, etc) 	<ul style="list-style-type: none"> <input type="checkbox"/> Productive use for civilian purposes (services) <input type="checkbox"/> Restitution of land claims <p>Security/environmental threats without proper land conversion</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Initial cleanup/preparation of land and/or superstructures <input type="checkbox"/> Protection between release from military and civilian use <input type="checkbox"/> Investments into civilian use
Military production/service facilities	<p>Different types of production/service entities with respect to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Type of product <input type="checkbox"/> Industrial sector <input type="checkbox"/> Military specificity of organization of production <input type="checkbox"/> exclusivity of military production <input type="checkbox"/> Level of technology <input type="checkbox"/> Ownership 	<ul style="list-style-type: none"> <input type="checkbox"/> Increase in civilian productive capacity for which there is demand in competitive markets 	<ul style="list-style-type: none"> <input type="checkbox"/> Conversion of production capacity <input type="checkbox"/> Organizational restructuring <input type="checkbox"/> Change in company culture <input type="checkbox"/> Adopting to civilian markets <input type="checkbox"/> Financing of necessary investment

Armed forces business operations in civilian markets	Differences with respect to: <input type="checkbox"/> Economic sector <input type="checkbox"/> Ownership <input type="checkbox"/> Degree of political protection/rent/corruption <input type="checkbox"/> Entitlement to income/profit	<input type="checkbox"/> Reduction of market distortion <input type="checkbox"/> Reduction of rent seeking	<input type="checkbox"/> Compensation of pension entitlements of members of armed forces <input type="checkbox"/> Compensation of armed forces for lost income opportunities
Military equipment	<input type="checkbox"/> Heavy weapons <input type="checkbox"/> Light weapons <input type="checkbox"/> Other equipment	<input type="checkbox"/> Limited reuse of other equipment <input type="checkbox"/> Income from scrapping Storage costs of weapons and ammunition if not scrapped Security problems from proliferation of small arms Availability of additional land through de-mining Humanitarian problems of mines and unexploded munitions	<input type="checkbox"/> Investment into proper disposal
Source of funds/entitlements	<input type="checkbox"/> Regular military budgets <input type="checkbox"/> Other government funds <input type="checkbox"/> Other institutionalized sources of funds <input type="checkbox"/> External funds/military aid <input type="checkbox"/> Income from military-run business/pension funds	<input type="checkbox"/> peace dividend through redistribution of money to private sector or reuse for civilian purposes in public sectors	<input type="checkbox"/> Reduction of funds/entitlements after the end of conflicts

References

- ACDA see United States Arms Control and Disarmament Agency.
- Alic, John A., Lewis M. Branscomb, Harvey Brook, Ashton B. Carter and Gerald L. Epstein. 1992. *Beyond Spinoff. Military and Commercial Technologies in a Changing World*. Boston, Massachusetts: Harvard Business School Press.
- Anthony, Ian. 1993. "The 'Third Tier' Countries: Production of Major Weapons." In Herbert Wulf, ed. 1993. *Arms Industry Limited*. Oxford: Oxford University Press.
- Ball, Nicole. 1984a. *Third World Security Expenditure: A Statistical Compendium*. FOA Report C 10250-MS. Stockholm: Försvarets Forskningsanstalt.
- _____. 1984b. "Measuring Third World Security Expenditure: A Research Note." *World Development* 12. pp. 157–164.
- _____. 1988. *Security and Economy in the Third World*. Princeton: Princeton University Press.
- _____. 1996. *Making Peace Work. Lessons for the International Development Community. Conference report*. Washington, DC: Overseas Development Council, May 9.
- _____. 1997a. "The Challenge of Rebuilding War Torn Societies." In Chester Crocker, Fen Osler Hampson with Pamela All, eds. *Managing Global Chaos: Sources and Responses to International Conflict*. Washington, DC: United States Institute of Peace Press.
- _____. 1997b. "Demobilizing and Reintegrating Soldiers: Lessons from Africa." In Krishna Kumar (ed.). *Rebuilding Societies after Civil War; critical roles for international assistance*. Boulder and London: Lynne Rienner. pp. 85–105.
- _____. 1998a. *Spreading good practices in security sector reform: Policy options for the British government*. London: Saferworld.
- _____. 1998b. "Addressing military expenditures and military roles in developing countries: A Review of Member's approaches." Paper prepared for the Information DAC Task Force on Conflict, Peace and Development Co-operation. Organisation for Economic Co-operation, Development Co-operation Directorate, September.
- _____. 1998c. "The International Development Community's Response to Demobilization." In Gebrewold, 1998, pp. 21–27.
- Batchelor, Peter. 1998. "South Africa's Arms Industry: Prospects for Conversion." In Jacklyn Cock and Penny McKenzie, eds. *From Defence to Development*. Cape Town, South Africa: David Philip Publishers.
- Bayoumi, Tamim, Daniel Hewitt and Steven Symanski. 1996. "Global disarmament and developing countries: A MULTIMOD simulation." In Gleditsch et al., 1996, pp. 491 – 520.

- Benge, Michael D., 1991. "Cambodia: An Environmental and Agricultural Overview," US AID, November 20, 1991.
- Benson, William. 1998. *Light Weapons Controls and Security Assistance: A Review of Current Practice*. London: Saferworld and International Alert, September.
- Berdal, Mats R. 1996. "Disarmament and Demobilization after Civil Wars." *Adelphi Paper*. No. 303. London: International Institute for Strategic Studies.
- BICC see Bonn International Center for Conversion.
- Bishak, Greg. 1997. *US Conversion after the Cold War, 1990–1997*. Brief 9. Bonn: BICC, July.
- Bonn International Center for Conversion. 1996. *Conversion Survey 1996. Global Disarmament, Demilitarization and Demobilization*. Oxford: Oxford University Press.
- _____. 1997. *Conversion Survey 1997. Global Disarmament and Disposal of Surplus Weapons*. Oxford: Oxford University Press.
- _____. 1998. *Conversion Survey 1998. Global Disarmament, Defense Industry Consolidation and Conversion*. Oxford: Oxford University Press.
- _____. 1999. *Conversion Survey 1996. Global Disarmament, Demilitarization and Demobilization*. Baden-Baden: Nomos.
- Boutwell, Jeffrey, Michael T. Klare and Laura W. Reed, eds. 1995. *Lethal Commerce: The Global Trade in Small Arms and Light Weapons*. Cambridge, MA: American Academy of Arts and Sciences.
- Brömmelhörster, Jörn, ed. 1999. *Paying the Peace Dividend*. Manuscript, Bonn, publication forthcoming.
- _____ and John Frankenstein, eds. 1999. *Mixed motives, uncertain outcomes. Defense Conversion in China*. Boulder, London: Lynne Rienner.
- Brzoska, Michael. 1981. "The reporting of military expenditures." *Journal of Peace Research*, Vol. 18, no. 4, pp. 373–384.
- _____. 1992. "Military trade, aid and debt." In Lamb and Kallab, 1992, pp. 79–112.
- _____. 1995. "World Military Expenditures," in Keith Hartley and Todd Sandler, eds., *Handbook of Defense Economics*, Volume 1. Amsterdam: Elsevier, pp. 45–67.
- _____. and Thomas Ohlson, ed. 1986. *Third World Arms Production*. London: Taylor&Francis.
- Call, Chuck. 1998. "Police reform, Human Rights and Democratization in Post Conflict Settings: Lessons from El Salvador." Foro sobre convivencia y seguridad ciudadana en el istmo centroamericano, Haiti y Republica Dominicana, San Salvador, Junio 2–4, 1998.

- Canada. The Department of Foreign Affairs and International Trade. *Consolidation of Peace through Practical Disarmament Measures: The Context*. Ottawa, April.
- Carbonnier, Gilles. 1998. *Conflict, Postwar Rebuilding and the Economy. A Critical Review of the Literature. The War-torn Societies Project*, Occasional Paper No. 2. Geneva: UNRISD.
- CBO. See Congressional Budget Office.
- Chan, Steven, 1995. "Grasping the Peace Dividend: Some Propositions on the Conversion of Swords into Plowshares." *Mershon International Studies Review*, Vol. 29, No. 2, pp. 53–95.
- Cheung, Tai Ming. 1997. "The Chinese Army's New Marching Orders: Winning on the Economic Battlefield." In Brömmelhörster and Frankenstein, 1997, pp. 181–204.
- Cilliers, Jakkie. ed. 1995. *Dismissed: Demobilisation and Reintegration of Former Combatants in Africa*. Halfway House, South Africa: Institute for Defence Policy.
- Colletta, Nat J., Markus Kostner and Ingo Wiederhofer. 1996a. *The Transition from War to Peace in Sub-Saharan Africa*. Directions in Development Series. Washington D.C.: World Bank.
- _____. 1996b. *Case Studies in War-to-Peace Transition; The Demobilization and reintegration of Ex-Combatants in Ethiopia, Namibia and Uganda*. World Bank Discussion Paper No. 331. Africa Technical Department Series. Washington D.C.: World Bank.
- Congressional Budget Office. 1995. *Cleaning Up Defense Installations: Issues and Options*. Washington, DC: Congressional Budget Office, January.
- Cunningham, Keith with Andreas Klemmer. 1995. *Restructuring the US Military Base in Germany. Scope, Impacts and Opportunities*. Report 4. Bonn: BICC, June.
- Cunningham, Keith. 1997. *Base Closure and Redevelopment in Central and Eastern Europe*. Report 11. Bonn: BICC, July.
- Dardia, Michael, Kevin F. McCarthy, Jesse Malkin and Georges Vernez. 1996. *The Effects of Military Base Closures on Local Communities: A Short-Term Perspective*. Santa Monica, California: RAND National Defense Research Institute.
- DeClerq, David. 1999. *Destroying Small Arms and Light Weapons. Survey of Methods and Practical Guide*. Report 13. Bonn: BICC.
- Deger, Saadet. 1986. *Military Expenditure in Third World Countries: The Economic Effects*. London: Routledge and Keegan Paul.
- Dercon, Stefan and Daniel Ayalew. 1998. "Where have all the soldiers gone: Demobilization and reintegration in Ethiopia." *World Development*, Vol. 26, No. 9, pp. 1661–1675.
- Di Chiaro, Joseph III. 1998. *Reasonable Measures: Addressing the Excessive Accumulation and Unlawful Use of Small Arms*. Brief 11. Bonn: BICC, August.
- Dunne, J. Paul. 1995. "The Defense Industrial Base." In Hartley and Sandler, 1995b, pp. 399–430.

- Dunne, J. Paul. 1996. "Economic effects of military expenditures in developing countries: A survey." In Gleditsch et al., 1996, pp. 425–438.
- EAC (Economic Adjustment Committee). 1993. *Civilian Reuse of Former Military Base Economic Adjustment Projects. Supplemental updates 31 December 1994 and 30 June 1995*. Washington, DC: Government Printing Office, September.
- Elliott, Valerie. 1998. "Overseas aid to clean up armies." *London Times*, 3 August 1999.
- Feldman, Jonathan M. 1997. *Diversification after the Cold War: Results of the National Defense Economy Survey*. Working Paper 112. Rutgers University Center for Urban Policy Research. New Brunswick, New Jersey.
- Franko, Patrice. 1996. "Defense Production in Argentina, Brazil and Chile: A Comparative Perspective." *Defense Analysis*, Vol. 12, No. 3, pp. 315–326.
- Gansler, Jacques S. 1995. *Defense Conversion. Transforming the Arsenal of Democracy*. Cambridge, Massachusetts: MIT Press.
- Gebrewold, Kiflemariam, ed. 1998. *Converting Defense Resources to Human Development*. Report 12. Bonn: BICC.
- Gleditsch, Nils Petter, Olav Bjerckholt, Adne Cappelen, Ron P. Smith and J. Paul Dunne. *The Peace Dividend. Contributions to economic analysis*. Amsterdam et al. Elsevier.
- GTZ (Gesellschaft für Technische Zusammenarbeit). 1996. *Experiences with the Demobilization and Reintegration of Ex-Combatants*. Report on the Workshop in Addis Ababa, April 1996. Eschborn. October.
- Guislain, Pierre. 1997. *The Privatization Challenge. A Strategic, Legal, and Institutional Analysis of International Experience*. World Bank Regional and Sectoral Studies. Washington, DC: The World Bank.
- Happe, Nancy and J. Wakeman-Linn. 1993. "Military expenditures and the arms trade: Alternative data sources. Parts I and II." *Peace Economics, Peace Science and Public Policy*, No. 1, pp. 3–38 and No. 2, pp. 10–23.
- Harkavy, Robert E. 1989. *Bases abroad: the global foreign military presence*. Oxford: Oxford University Press.
- Hartley Keith and Todd Sandler. 1995a. *The Economics of Defence*. Cambridge: Cambridge University Press.
- _____ eds. 1995b. *Handbook of Defense Economics*. Vol. 1. Amsterdam: Elsevier.
- Hewitt, Dan P. 1993. "Military expenditures worldwide: Determinants and trends." *Journal of Public Policy*, Vol. 12, No. 1, pp. 102–152.
- IMF. See International Monetary Fund.
- IISS. See International Institute for Security Studies.
- International Institute for Security Studies. 1998. *Military Balance 1998/99*. Oxford: Oxford University Press.

- International Monetary Fund. 1997. *World Economic Outlook. A Survey by the Staff of the International Monetary Fund*. Washington, DC: IMF, October.
- _____. 1998a. "Transparency in Government Operations." *IMF Survey*, April 27, pp. 121–124.
- _____. 1998b. *Manual on Fiscal Transparency*.
[<http://www.imf.org/external/np/fad/trans/manual/intro.htm>]
- Jane's. 1998. *Jane's Fighting Ships 1998/99*. Coulsdon: Jane's.
- _____. 1999. *Jane's Infantry Weapons. 1999/2000*. Coulsdon: Jane's.
- Jean, Francois and Jean-Christophe Rufin, eds. 1996. *L'économie des guerres civiles*. Paris: Hachette.
- Joint Research Centre. European Commission. 1995. *International Workshop and Study on the State of Knowledge for the Localisation and Identification of Anti-Personnel Mines*. Luxembourg: Office for Official Publications of the European Communities.
- Keegan, John. 1983. *World Armies*. 2nd ed. London: Macmillan.
- Kelley, Maryellen R. and Todd A. Watkins. 1995. "In From the Cold: Prospects for Conversion of the Defense Industrial Base." *Science*, Vol. 268, pp. 525–532.
- Kiggundu, Moses. 1997. *Retrenchment Programs in Sub-Saharan Africa: Lessons for Demobilization*. BICC Paper 10. Bonn: BICC.
- Kingma, Kees, ed. 1999. *Demobilization and Reintegration in Sub-Saharan Africa*. Macmillan: London, in print.
- _____. 1996. "The Role of Demobilization in the Peace and Development Process in Sub-Saharan Africa: Conditions for Success." *African Security Review*, Vol. 5, No. 6, pp. 33–42.
- _____. 1998. "Demobilization and Reintegration: An Overview." In Gebrewold, 1998, pp. 12–20.
- Knight, Malcolm, Norman Loayza and Delano Villanueva. 1995. "The peace dividend: military spending cuts and economic growth." *IMF Working Paper*. International Monetary Fund (IMF).
- Lamb, Geoffrey and Valeria Kallab, eds. 1992. *Military expenditure and economic development. A symposium on research issues*. World Bank Discussion Papers 185. Washington: World Bank.
- Laurence, Edward J. 1998. *Light Weapons and Intrastate Conflict: Early Warning Factors and Preventative Action A Report to the Carnegie Commission on Preventing Deadly Conflict*. New York: Carnegie Corporation of New York.
- _____. and Herbert Wulf, with the assistance of Joseph DiChiaro III. 1995. *Conversion and the Integration of Economic and Security Dimensions*. Report 1. Bonn: BICC.

- _____. 1998. *Light Weapons and Intrastate Conflict: Early Warning Factors and Preventative Action A Report to the Carnegie Commission on Preventing Deadly Conflict*. New York: Carnegie Corporation of New York.
- Lebovic, James H. 1998. "Consider the Source: Organizational Bias in Estimates of Foreign Military Spending." *International Studies Quarterly* Vol. 42, No. 2, pp. 161–174.
- _____. 1999. "Using Military Spending Data: The Complexity of Simple Interference." *Journal of Peace Research*, accepted for publication.
- Li, Hung-Yi and Peter Pauly. 1996. "Multilateral Disarmament: Projekt LINK Simulations." In Gleditsch et al., 1996, pp. 521–532.
- MacDonald, Brian S. 1997. *Military Spending in Developing Countries: How Much is Too Much?* Richmond: Carleton University Press.
- Mahling Clark, Kimberly. 1996. "Fostering a Farewell to Arms: Preliminary Lessons Learned in the Demobilization and Reintegration of Combatants." Washington, DC: Research and Reference Service, USAID Center for Development Information and Evaluation.
- Markusen, Ann R. 1986. "The Militarized Economy." *World Policy Journal*, Vol. 3, No. 3, pp. 495–516.
- _____ and Joel Yudken. 1992. *Dismantling the Cold War Economy*. New York: Basic Books.
- McNeill, William H. 1982. *The Pursuit of Power: Technology, Armed Force and Society Since A.D. 1000*. Chicago: University of Chicago Press.
- Melman, Seymour. 1974. *The Permanent War Economy. American Capitalism in Decline*. New York: Simon and Schuster.
- Miller, Ian. 1998. *Small Arms and Light Weapons: An Annotated Bibliography, Update 1996–1998*. Department of Foreign Affairs and International Trade, Ottawa, Ontario, Canada. [http://www.dfait-maeci.gc.ca/english/foreignp/disarm/small_arms-e.htm]
- Morrison, Philip and Kosta Tsipis. 1997. "New Hope in the Minefields." *Technology Review*, October.
- Neild, Rachel. 1988. *Themes and Debates in Public Security Reform. Police Recruitment*. Washington, DC: Washington Office on Latin America, November.
- Nübler, Irmgard. 1997. *Human Resources Development and Utilization in Demobilization and Reintegration Programs*. BICC Paper 7. Bonn: BICC.
- Oakley, Robert B., Michael J. Dziedzic, Eliot M. Goldbert, eds. 1998. *Policing the New World Disorder. Peace Operations and Public Security*. Washington, DC: National Defense University Press.
- OECD see Organisation for Economic Co-operation and Development.
- Organisation for Economic Co-operation and Development. 1997. *Military Expenditures in Developing Countries: Security and Development. Report of the Ottawa Symposium*. Paris: OECD.

- _____. 1998. *Conflict, Peace and Development Co-operation on the Threshold of the 21st Century*. Development Co-operation Guidelines Series. Paris: OECD.
- OTA. See United States Congress. Office of Technology Assessment.
- Poulton, Robin and I. Youssouf. 1998. *A Peace of Timbuktu: Democratic Governance, Development and African Peacemaking*. New York and Geneva: UNIDIR.
- Project Ploughshares. 1998. *Armed Conflicts Report 1998*.
www.ploughshares.ca/content/ACR/ACR98.html.
- Russett, Bruce and J. Slembrod. 1993. "Diminished Expectations of War and Increased Personal Savings: Evidence from Individual Survey Data." *American Economic Review*. Vol. 83, No. 4, pp. 1022–1033.
- Seth, Anand K. 1996. *Leveraging for Success*. Presentation given before the US European Command Military-to-Military Exchange Conference. Garmisch, Germany, 6–9 May.
- Shirley, Mary and John Nellis. 1991. *Public Enterprise Reform. The Lessons of Experience*. Economic Development Institute of the World Bank. Washington, DC: The World Bank.
- Singh, Jasjit, ed. 1995. *Light Weapons and International Security*. Delhi and Washington: Indian Pugwash Society and British American Security Information Council. [<http://www.igc.apc.org/basic>]
- Singh, Ravi Pal. 1998. *Arms Procurement Decision Making. Vol 1: China, India, Israel, Japan, South Korea and Thailand*. Oxford. Oxford University Press.
- SIPRI. See: Stockholm International Peace Research Institute.
- South African Department of Land Affairs. 1997. *White Paper on South African Land Policy*. Pretoria, South Africa, April.
- Stockholm International Peace Research Institute 1998. *International Security, World Armament and Disarmament, SIPRI Yearbook 1998*. London: Taylor and Francis; Oxford: Oxford University Press.
- Stremlau, John A. and Francisco R. Sagasti. 1998. *Preventing Deadly Conflict. Does the World Bank Have a Role? A Report to the Carnegie Commission on Preventing Deadly Conflict*. New York: Carnegie Corporation of New York.
- Tsipis, Kosta. 1996. *Report on the Landmine Brainstorming Workshop of August 25–30, 1996*. Program in Science & Technology for International Security, Massachusetts Institute of Technology.
- UNIDIR. See United Nations Institute for Disarmament Research.
- United Nations. 1993. *General and Complete Disarmament: Transparency in Armaments*. *United Nations Register of Conventional Arms*. General Assembly Document A/48/344, 11 October 1993.
- _____. 1995. *World Economic and Social Survey 1995. Current Trends and Policies in the World Economy*. New York: United Nations.

- _____. 1996. United Nations Demining Database.
[<http://www.un.org/Depts/Landmine/>].
- _____. 1997. *Report of the Panel of Governmental Experts on Small Arms*. General Assembly Document A/52/298, 27 August.
- United Nations Institute for Disarmament Research. 1992. *Economic Aspects of Disarmament: Disarmament as an Investment Process*. A report authored by Hartley, Keith, Amit Bhadury, Evgueni Vladimirovich Bougrov, Saadet Deger, Ali E. Hillal Dessouki, Jacques Fontanel, Hendrik de Han, Michael D. Intrilligator and Alejandro Nadal Egea. New York: UNIDIR.
- United States Arms Control and Disarmament Agency. 1998. *World Military Expenditures and Arms Transfers 1997*. Washington, DC: Government Printing Office.
- United States Congress. Office of Technology Assessment. 1992. *Building Future Security. Strategies for Restructuring the Defense Technology and Industrial Base*. OTA-ISC-530. Washington, DC: US Government Printing Office.
- United States Department of State. 1998. *Hidden Killers 1998: The Global Landmine Crisis*. Department of State Publication 10575. Washington, DC: United States Department of State, Bureau of Political-Military Affairs, Office of Humanitarian Demining Programs.
- United States General Accounting Office. 1996a. *Defense Ammunition. Significant Problems Left Unattended Will Get Worse*. GAO/NSIAD-96-129. Washington, D.C.
- _____. 1996b *Military Bases: Update on the Status of Bases Closed in 1988 and 1991, and 1993*. GAO/NSIAD-96-149. Washington, DC. August.
- Wallensteen, Peter and Margareta Sollenberg. 1998. *Armed Conflict and Regional Conflict Complexes, 1989–97*. Vol. 35, no. 5, pp. 621–634.
- Weichhardt, Reiner, ed. 1994. *Privatization in NACC Countries: Defence Industry Experiences and Policies and Experiences in Related Fields*. 1994 NATO Economics Colloquium. Brussels: NATO.
- World Bank. 1992. “Guidelines on military expenditures.” Memo, Washington, DC.
- _____. 1994. *Governance. The World Bank’s Experience. Development in Practice*. Washington, DC: The World Bank.
- _____. 1997. *The State in a Changing World*, World Development Report 1997. Washington, DC: The International Bank for Reconstruction and Development/The World Bank.
- _____. 1998. *Post-Conflict Reconstruction. The Role of the World Bank*. Washington, DC: The World Bank.
- _____. 1999. *Curbing Corruption: Toward a Model for Building National Integrity*. EDI Development Studies Washington, DC: World Bank.
- Zartman, I. William. 1989. *Ripe for Resolution: Conflict and Intervention in Africa*. Oxford: Oxford University Press.