

10 The Demand Side of CBW Proliferation

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INTRODUCTION

Proliferation is the lateral spread of certain weapon systems from a place where they are available to another place where they have yet to be introduced. It is obviously a form of technology transfer. The proliferation process can take different forms. In some cases, entire weapon systems are transferred. In other cases, the recipient country acquires dual-use technology, knowledge, equipment or other commodities to set up a domestic armament programme. The notion of 'proliferation' is usually reserved for non-conventional – nuclear, biological, chemical – weapons and advanced weapon platforms such as aeroplanes and ballistic missiles. The first introduction of these weapons into a volatile region can seriously upset the military balance. If other countries counterbalance the move by also seeking such weaponry, a destabilizing arms race with consequences far outside the region in question may ensue.

In 1984, the United Nations confirmed for the first time that chemical weapons (CWs) were being used in the 1980–88 Iran–Iraq War, and many industrialized states became increasingly concerned that developing countries were incorporating chemical and biological weapons (CBWs) into their military arsenals. It soon became clear that many Western companies were supplying Iraq with the technological know-how, infrastructure and raw materials to produce CWs. At the time, most industrialized states had no laws or regulations prohibiting or restricting these transactions. Following the examples of the Co-ordinating Committee on Multilateral Export Controls (COCOM), the Zangger Committee and Nuclear Suppliers Group, several industrialized countries began to meet within the informal arrangement of the Australia Group to co-ordinate their national export control regulations with respect to CBWs. The participants in these meetings also

agreed to common lists of goods which are critical to the manufacture of chemical or biological weapons.¹

As no major trade in or direct transfer of chemical and biological weapons is known to exist, dual-use goods are central to the CBW proliferation mechanisms. This characteristic complicates the CBW proliferation issue. By definition, dual-use commodities have legitimate civilian applications, but they may also be used in armament programmes. Restricting the transfer of dual-use goods may thus hinder the development of the economic, technological, scientific and social base of the recipient country. The fear of such consequence has led several developing countries to express serious concern about multilateral export control arrangements by supplier states, such as the Australia Group. These countries also point to the 1972 Biological and Toxin Weapon Convention (BTWC) and the 1993 Chemical Weapons Convention (CWC), which prohibit the acquisition and possession of biological or chemical weapons, but also urge parties not to impede economic and technological development for purposes permitted by the conventions.

Since the end of the Cold War, the proliferation debate has shifted in some major ways. The 1990–91 Gulf War pitted the world's most advanced armed forces against a regional power armed with CBWs. Although Iraq's non-conventional capabilities had only a relatively minor impact on the conduct of military operations by the Allied Coalition, the war has had three long-lasting consequences. First, the United Nations Special Commission on Iraq (UNSCOM), tasked with the elimination of Iraq's CBWs and missiles, uncovered how much more advanced the respective programmes were than had been assumed, and how self-sufficient Iraq had become in the development and production of such weapons. Second, although the war speeded up the negotiation of the Chemical Weapons Convention, the problem UNSCOM has experienced in revealing the full extent of Iraq's CBW programmes has cast doubt on the effectiveness of verification mechanisms in disarmament treaties. This doubt has reinforced the conviction among certain industrialized countries that the biological, toxin and chemical weapons conventions must be supplemented with export controls to prevent further proliferation of chemical and biological weapons. Third, thousands of Coalition soldiers have experienced a variety of illnesses connected to service in the Gulf during the war. An increasing number of reports link the ailments to the many toxic chemicals present in the Kuwait theatre of operations, and the administration of preventive drugs and vaccinations to counter the effects of CBWs. The possible connection between low-level exposure to chemical or biological warfare agents and these illnesses cause concern that even the limited CBW capabilities of a small power can inflict long-term damage on the best-equipped forces. Several Western powers

have subsequently launched major research and development and acquisition programmes to counter CBW threats in future interventions.

Another major development in the proliferation debate since the end of the Cold War is the acquisition of CBWs by terrorist and criminal organizations. In 1994 and 1995, a Japanese extremist religious cult, *Aum Shinrikyo*, released the nerve agent *sarin* in Matsumoto and Tokyo, killing 12 people and injuring thousands more. The Japanese investigation revealed that the sect also had an advanced biological weapons programme, and had even tested *anthrax* on unsuspecting citizens. Since 1990, the USA has suffered a series of major terrorist attacks, including the first major ones inside its borders, which caused a considerable psychological shock. Since the Japanese incidents, fear has increased that terrorist and criminal organizations have crossed a psychological barrier and may make CBWs their weapons of choice. While the chance of a war or a major terrorist attack in which CBWs are used remain relatively low, the consequence of a lack of preparation are extremely serious, and at present few Western governments feel that they can safely ignore the issue.

The history of the CBW proliferation issue and the policy responses by mainly the industrialized countries has kept the focus of analysis on the supply side of the proliferation process. Apart from some general observation about why certain states may wish to seek CBWs, the demand side is ignored in proliferation analyses. This leads to several misconceptions – for instance, the widespread belief that only so-called ‘rogue states’ pursue CBW programmes – that prevent deeper understanding of proliferation mechanisms, and thus preclude policy options which target the proliferation pressures in the recipient state. Disarmament treaties, for instance, target certain armament programmes inside a country because they aim to reduce particular arms categories to zero, and therefore oblige a party to abandon any aspiration to acquire the prohibited weapons. The non-proliferation imperative currently reduces disarmament to but one of several policy options to reverse the spread of CBWs.

This chapter investigates the various factors that induce a country to seek chemical or biological weapons, the domestic processes involved, and finally, how proliferation processes may be understood despite lack of insight into the decision-making practices of some countries.

IDENTIFYING THE PROLIFERATOR

Proliferation conjures up the image of an oil slick spreading steadily from a central point to cover an ever-widening area. There is a sense of inescapability: all parts of that area are equally affected, and unless a physical dam is

erected, containment is impossible. This was essentially how the CBW proliferation threat was presented during the 1980s. In testimony to the US Congress, officials and policy analysts repeatedly stated that as many as 24 countries might be developing chemical weapons, a figure which had risen from less than half a dozen at the beginning of the decade. With over 100 countries possessing a chemical industry enabling them to produce CWs at short notice, it was feared that the number could rapidly increase further.² A similar assessment was made for biological weapons: as many as 100 countries might soon be able to manufacture biological warfare agents without outside help, because of the increasing availability of biotechnology and advanced expertise.³

In the 1990s, the threat assessment changed in two significant ways. First, the number of proliferators stabilized at around 20 states which have or may be developing nuclear, biological or chemical weapons, or their missile delivery systems.⁴ As the figure now comprises four weapon categories, it is more difficult to isolate the CBW threat assessment. In November 1997, the US Department of Defense listed nine countries as having a CW programme in various stages of development, and seven as having a BW programme. Some countries, however, are conspicuously absent from these lists.⁵ Second, rogue states have become the focus of proliferation threat assessments. A rogue state is generally undemocratic, geopolitically dissatisfied, hostile to Western interests, and unlikely to uphold widely accepted international norms of behaviour. This focus may help to explain the absence of some countries from recent CBW proliferation lists. More importantly, the qualification suggests that attempts to acquire chemical or biological weapons are closely correlated to the type of political regime. However, this is historically incorrect.⁶

Chemical warfare, as it is understood today, is a typical product of the second industrial revolution which took place in Western Europe and the USA at the end of the nineteenth century.⁷ One characteristic of this industrial revolution was the increasingly utilitarian application of scientific principles driven by an economic rationale. The First World War provided the stimulus to apply this new scientific knowledge to warfare. For instance, most of the toxic chemicals used as warfare agents on the battlefields had been discovered decades earlier, but were not then considered by the military or scientists as new weapons of war. CW proliferation began as soon as those countries at the threshold of a CW capability moved to establish a research and production base dedicated to purposefully acquiring such weaponry, and erected a bureaucracy and decision-making procedures with the organization of CW employment and defence as their prime purpose. Since then, proliferation processes have taken on different forms.⁸ Democracies as well as states with other forms of governance have had active CBW

programmes, and have used or been prepared to use these weapons in war. During the past eight decades, the identity and the number of countries pursuing CBW capabilities has changed as new programmes were initiated or existing ones were abandoned. The intensity with which a CBW capability was pursued has varied greatly, so that even states with uninterrupted CBW programmes have at times found themselves totally unprepared to wage or defend against chemical or biological warfare. In fact, the form of governance has no bearing on *whether* a state will seek to acquire chemical or biological weapons, but does play a major role in *how* it will organize its CBW armament programmes.

In 1992–93, Russia, the UK and the USA released details of their respective proliferation threat assessments. This enables the comparative analysis of intelligence assessments of certain countries for the same period.⁹ Table 10.1 summarizes the data on chemical, biological and missile programmes for the countries in the Middle East. At that time, Iraq was the only country which possessed a confirmed CW capability, and UNSCOM would not uncover the extent of Iraq's BW programme for another two years. The most striking feature of Table 10.1 is the consensus on the identity of the main proliferators. Specific details about possession, programmes or capabilities vary in some instances, and may reflect different intelligence data or the use of different sets of analytical criteria. The Russian Foreign Intelligence Service Report was singular in its claim that Israel has a CW capability. It also denied that Syria, a former Soviet client state, had biological weapons. Only one US intelligence source claimed that Saudi Arabia may possess chemical weapons.¹⁰ Other agencies do not appear to have repeated the assertion since.

Of the 20 Middle Eastern states under consideration, all but six were systematically associated with CBW programmes in the three intelligence assessments. This may appear remarkable, especially in the light of the traditional arguments about why countries wish to acquire a CBW capability. These arguments are mostly linked to factors or developments external to the state seeking CBWs. Among the external causes often cited are: deterrence, self-defence (including the function of CBWs as force multipliers to offset the military superiority of a rival state), aggression and coercion. Status and regime survival are often advanced as internal causes for the proliferation of non-conventional weapons, but may be of lesser importance for CBWs, as strong international disapprobation tends to force governments to keep such programmes secret.¹¹ The focus on external causes follows mostly from the methodology: 'primarily a deductive exercise based upon the strategic requirements of particular states, the tactical needs of their armed forces, and the utility of chemical weaponry for Third World conflicts'.¹² The geographical limitations of the methodology thus exclude

Table 10.1 Comparison of intelligence assessments on the possession of chemical and biological weapons and missiles

	USA			UK			Russia		
	CW	BW	M	CW	BW	M	CW	BW	M
Algeria				N	N	Y	N	N	Y
Bahrain									
Egypt	?	P	Y	Y	N	Y	P	P	Y
Iran	Y	P	Y	Y	P	Y	Y	N/P	Y
Iraq	Y	P	Y	Y	Y	Y	Y	P	Y
Israel	?	P	Y	C	C	Y	Y	N	Y
Jordan				N	N	N			
Kuwait									
Lebanon									
Libya	Y	P	Y	P	P	Y	Y	P	Y
Mauritania									
Morocco									
Oman									
Qatar									
Saudi Arabia	?		Y						
Syria	Y	P	Y	Y	P	Y	Y	N	Y
Tunisia									
Turkey									
UAE									
The Yemen			Y						

Notes: CW = chemical weapons; BW = biological weapons; M = missiles. Y indicates statement of possession; N indicates statement of non-possession; ? indicates probable possession; P indicates a programme under way; C indicates capable; blank indicates no information given.

Sources: US assessments: Z.S. Davis, S.R. Bowman and R.D. Shuey, *The Proliferation of Nuclear, Chemical, and Biological Weapons and Missiles* (Washington DC: Congressional Research Service, Library of Congress, 8 April 1992). R.M. Gates, 'The proliferation of weapons of mass destruction and the intelligence community response', statement of Director of Central Intelligence to the US House of Representatives Committee on Banking, Finance, and Urban Affairs, 8 May 1992; J. Woolsey, testimony by Director of Central Intelligence, to the Senate Governmental Affairs Committee (24 February, 1993), and United States Information Service, 'Woolsey outlines US security concerns', testimony before the Senate Select Committee on Intelligence (Embassy of the United States of America: Brussels, 26 January 1994). UK assessments: J. Reed, *Defence Exports, Current Concerns*, Jane's Special Brief, No. 1 (Coulsdon, Surrey: Jane's Information Group, April 1993). Russian assessments: Foreign Intelligence Service of the Russian Federation, *A New Challenge After the Cold War: The Proliferation of Weapons of Mass Destruction*, released at a press conference, Moscow, 28 January, 1993 (translated from Russian by the Foreign Broadcast Information Service).

analysis of non-possessors of CBWs and of past CBW programmes in industrialized states.

Reference to the Third World may in itself be misleading. The states in Table 10.1 allegedly seeking chemical and biological warfare capabilities are among the most advanced and richest industrialized countries. However, other Middle Eastern states also belong to the group of rich and advanced developing countries. The six alleged proliferators allocate some of the highest percentages of gross national product (GNP) in the world to defence.¹³ Other countries in Table 10.1 also rank among the global top 20 as regards defence expenditure. The hypothesis can be advanced that richer and more advanced developing countries, which reserve a large slice of their GNP for external security, support CBW armament programmes, but that these characteristics are not necessary indicative of an interest in acquiring chemical or biological weapons.

The supposition that chemical or biological weapons may offset geostrategic vulnerabilities is also weakly supported by evidence from the Middle East, where three important factors influence the balance of power: population size, economic strength, and territorial size and location. Governments may view chemical and biological warfare capabilities as a means of counterbalancing disadvantages in these areas. Yet all the countries systematically associated with CBWs, except Israel, have some of the largest populations in the Middle East. Chemical weapons in particular may also be attractive as a relatively easy or inexpensive way to deny enemy forces passage through relatively inaccessible or sparsely populated areas. None of the presumed possessor countries, with the exception of Israel, has a high population density. For the region, however, they still have some of the higher rates. Saudi Arabia, one of the most vulnerable states, has only an estimated 8 people/km². Only Oman has a lower population density. Chemical and biological weapons may have a high political value as strategic weapons, especially if they can be delivered by ballistic missiles with the range to target the major population centres of an opponent. A high rate of urbanization may thus imply a high degree of vulnerability, and could increase the attractiveness of a chemical or biological arsenal for deterrence or coercion. Egypt (about 45 per cent), Syria (about 50 per cent) and Iran (about 54 per cent) have some of the lower urbanization rates in the region, surpassing only Yemen (about 25 per cent) and Oman (about 9 per cent). The rates of urbanization in Iraq (about 73 per cent) and Israel (about 90 per cent) are comparable with those of the other states in Table 10.1. The data seem to suggest that several regimes are prepared to exploit an awareness of the relative strategic advantage offered by the high urbanization rates in other countries. However, considering that almost every country faces threats from many directions, the data

fail to explain why other Middle Eastern states do not exploit this vulnerability of potential adversaries.

The argument of offsetting strategic disadvantages with chemical and biological weapons appears even more implausible if projected against the backdrop of the three major geopolitical cleavages in the Gulf region, namely between the member states of the Gulf Co-operation Council (GCC),¹⁴ Iran and Iraq. The disparities between the countries with respect to territorial expanse on the one hand and population size and number of military personnel on the other are enormous. Between 1985 and 1992, the numerical imbalance in military personnel was greatly reduced as a consequence of troop reductions in Iran and Iraq and force increases in the GCC states.¹⁵ Furthermore, since the Iran–Iraq War, the GCC states have acquired high-technology weaponry and missiles to counterbalance their numerical inferiority. Saudi Arabia, in particular, has given top priority to improving its air force – especially with the acquisition of AWACS early-warning aircraft – as this is the only one of its armed forces capable of patrolling or repelling an attack in the remote areas. The spending spree after the 1990–91 Gulf War reinforced this trend. The absence of an indigenous defence industry has always made the GCC members dependent on foreign suppliers of military technology and expertise. In other words, the countries that might gain the most from the force-multiplying effect of chemical or biological capabilities to compensate for their geographic and demographic disadvantages are, according to Table 10.1, not associated with CBW proliferation. Although they are acutely aware of their strategic vulnerabilities and consider ballistic missiles an appropriate part of their force posture, the GCC countries display little interest in chemical or biological weaponry.¹⁶

Since states within a geopolitical region all facing similar external threats, make different decisions regarding the acquisition of chemical or biological weapons, internal factors in each state must influence these decisions. With the exception of Israel, all the countries identified in Table 10.1 as seeking chemical and biological weapons have experienced revolution in the past five decades. Over half of the other countries are relatively stable, conservative monarchies, while the remainder have undergone abrupt changes of governance. If the alleged and confirmed possessors of CBWs are contrasted with the conservative monarchies, it may appear that the internal legitimization of the revolutionary governments through international prestige increases the incentive to acquire CBWs. However, international disapprobation counters this push factor for CBW armaments by forcing governments generally to keep the programme secret. The importance of the distinction between the revolutionary and conservative societies reaches deeper: the revolutions injected a Western-style – capitalist, communist or fascist – modernization ideology into the traditional societies. In the Gulf

region, the dominance of oil-based industry and organic chemistry on which it is based may bring chemical weapons within reach, but these weapons none the less still present a formidable technological challenge. In addition, chemical and biological armaments require a societal culture that reflects that modernization ideology. The conservative Islamic Gulf monarchies – which, as far as is known, display little interest in such weaponry – strongly resist the influences of modernity. By contrast, the revolutions in the Arab republics were carried out by officers trained in industrialized states, and were based on concepts from industrialized societies. These revolutions theoretically increase the receptivity for a technologically complex form of warfare with CBWs. From this perspective, Israel is no longer the odd country out among the presumed possessors of CBWs: regarding education, technology and industry, it resembles the West in many respects. Iran is also less of an exception: before the revolution in 1979, the Shah had pushed to modernize the country in fundamental ways since the 1950s. Immediately after the revolution, the country faced the onslaught of modern technology in the 1980–88 Iran–Iraq War, and since then the secular rather than the religious pillar of power continues to drive the trend for modernization. Modernization is thus a key concept, because whoever seeks a CBW capability is developing leading-edge technology for that society.

The presumed possessors of chemical and biological weapons in the Middle East also share a fundamental dissatisfaction with the regional geopolitical status quo, which may be a further expression of the need for internal or external legitimacy for the regimes concerned. A global comparison between possessors and non-possessors of chemical weapons reveals the deeper meaning of this shared characteristic. As of January 1998, four countries are formally known to have CW stockpiles: India, Iraq, Russia (as successor state to the Soviet Union) and the USA.¹⁷ The latter two countries apparently contradict the hypothesis that progress towards the so-called ‘third industrial revolution’ reduces the need for chemical weaponry, because high technology offers defence planners other options. However, India, Iraq, the Soviet Union and the USA have all had to meet any possible threat autonomously at every possible level of conflict. Before the Second World War, when they had to ensure their security independently, several second-tier European powers also maintained offensive CW programmes.¹⁸ After 1945, they joined military alliances such as the North Atlantic Treaty Organization or the Warsaw Treaty Organization, whereby they made their security dependent on a large power. Consequently, they no longer had to meet each separate security contingency individually. A pertinent example is the UK, which ceased its autonomous offensive CW programme in 1956, and destroyed its last stocks of CW in 1959.¹⁹ These moves coincided with its nuclear collaboration with the USA. For the Soviet Union and the USA,

as leaders of their respective alliances, the post-war era caused little change to the principle of total self-sufficiency. India and Iraq, both with regional hegemonic ambitions, as evidenced by their respective nuclear weapon programmes, also seek military self-sufficiency. International isolation or the imposition of international sanctions against a country also reinforce the factor of total self-reliance. As the cases of Iran, Libya and South Africa illustrate, perceived military necessity and the possible symbolism of international defiance can easily overcome political and moral opposition.

The self-sufficiency explanation also appears to be valid in the Middle East, and again plausibly places Israel and the Arab states inside the group of proliferators. For years the conservative monarchies have made their security clearly dependent on the West, and on the USA in particular, and this dependency was confirmed after the 1990–91 Gulf War. Kuwait, for example, does not intend to acquire chemical weapons even in the event of a distinct threat or use of CWs, because it relies on the security guarantees extended by the USA.²⁰ In other words, the realization of the security deficit and the conscious choice of security dependency also plays a role in the political decision whether or not to proliferate.

UNDERSTANDING CBW PROLIFERATION FROM THE DEMAND SIDE

Motivations for arms acquisitions range from a state's uncertainty about its security in the international system to fundamental dissatisfaction with its geopolitical conditions. How states react to this environment depends less on external than on internal factors. All states face a complex combination of material, political and societal constraints which policy-makers must take into account when devising and implementing national security policies. These constraints also influence the nature of the weapons a state will acquire. According to the assimilation model, decision-makers must overcome these constraints if they wish to deploy a particular type of weaponry, and are consequently prepared to pay certain opportunity costs to achieve that goal.²¹

From the demand-side perspective, proliferation can be defined as follows:

- 1 Chemical or biological weapon proliferation occurs when a political entity decides to acquire a chemical or biological weapon capability where such a capability does not yet exist, provided this decision is followed by a chemical or biological weapon armament dynamic.²²
- 2 Conversely, chemical or biological weapon deproliferation occurs as soon as the political commitment to that decision ceases to be renewed,

or if that political entity explicitly reverses such a decision. By defining proliferation as an armament dynamic in the recipient country, the process can be incorporated in the assimilation model of armament theory.

Assimilation is the process by which, for a particular weapon, weapon system or arms category, political and military imperatives, as constrained by the material base of the political entity, become reconciled with each other so that the weapon, weapon system or arms category become an integral part of current mainstream military doctrine. Any weapon, weapon system or arms category must consequently satisfy political as well as military imperatives. This presupposes the existence of a dual decision-making track: one in which military appraisals are primary, and one in which political considerations play the dominant role. The military track relates to those decisions taken by the military establishment to effect the military facet of the security policy of a political entity, including first and foremost the development and implementation of doctrine. The strategic planners will take into account external factors, such as the changing military threat, and internal factors, such as outputs of decisions on the political track. On the political track, overall policy decisions are taken regarding security and the means of implementing security policy. These may range from the formulation of a national security policy by the government and the parliamentary budget process to the expression of institutional interests inside and outside the armed forces, and inter- and intra-service rivalries within the military. As the military and political tracks interact, any decision, or set of decisions, not only influences future decisions on the same track, but also has ramifications for progress on the other track. A considerable level of tension may exist between both tracks, especially if actors on one track make demands which are irreconcilable with the basic goals or premises of the actors on the other track.

Any initial proposal for a particular type of weaponry envisages a particular end result. However, the weapon actually produced and deployed with the armed forces may differ significantly from the weapon originally anticipated. This variance between the original concept and the final product is the aggregate of all opportunity costs paid in the effort to achieve the original concept. As the proposed weapon system enters the decision process, multiple decision thresholds must be crossed. This process involves many discrete minor and major decisions at the various stages of the armament dynamic. To overcome any such threshold, an opportunity cost has to be paid. The opportunity cost may relate to a variety of issues, such as meeting environmental concerns, finding fiscal resources, convincing the military of the programme's utility, political opportunism, prioritizing allocation of resources to overcome technical difficulties, pressures for

disarmament or from international humanitarian law, public opinion, and so on. Opportunity cost thus not only involves a monetary cost to overcome the obstacle, but also the expenditure of political capital to ensure continuation of the programme at a particular stage. Different times and circumstances may result in different opportunity costs to be paid for similar decisions at a comparable stage of the armament dynamic. For example, legal or moral objections to chemical and biological weapons will be easier to overcome in a country facing an acute external threat than in one located in a region with low-level tensions. Decisions against the armament dynamic are as crucial as those promoting its continuation: they will affect the outcome of the dynamic as a consequence of an increased variance between the original concept and the final product.

The nature of the thresholds is determined by intrinsic factors if they refer to the country's material base, and extrinsic ones if they relate to the environment in which the weapon system is being conceived. The country's material base constitutes a particularly important independent variable affecting decision-making on both the military and political tracks. It includes factors which can hardly, or not at all, be influenced by the decision processes within the time frame of the armament dynamic under consideration. It consists of a country's physical base – geographical position, territorial size, population size, natural resources, easy access to resources abroad – as well as the standard of the population's education, the level of scientific, technological and industrial development, economic strength, culture, and so on. In other words, all other factors being equal, differences between the material base of any two countries may account for the different characteristics and results of the respective outputs. Each of the intrinsic and extrinsic elements may raise or lower the opportunity cost for crossing the hurdle.

At the end of the armament process, the summation of all opportunity costs paid at each threshold will determine the final outcome of the weapon system. There are three theoretical outcomes:

- 1 The variance between the original concept and the final product is nil if the weapon system has been achieved as originally conceived without any (uncalculated) opportunity costs.
- 2 The variance is infinite if the aggregate opportunity cost is too high – if, for whatever reason or combination of reasons, the weapon system is not produced or deployed.
- 3 In most cases, the variance will lie between these two extremes, and will consequently reflect the deployed weapon system as the result of all opportunity costs paid.

These outcomes are valid only if it is accepted that the policy proposers will try to keep the variance as small as possible – an assumption which is embedded in the assimilation process described above.

FROM ARMAMENT TO PROLIFERATION ANALYSIS

It was noted above that countries, which had achieved the second industrial revolution, introduced chemical weapons to the battlefield in the First World War. After the Second World War, countries moving into the third industrial revolution gradually abandoned CWs, as nuclear and improved conventional weapons based on the emerging technologies were able to perform the battlefield task of CWs. The acquisition of a particular type of weapon technology or the incorporation of a certain mode of warfare into mainstream military doctrine can thus be correlated to the level of development of a political entity. As these levels of development can be compared and contrasted, comparative studies will identify the relevant thresholds, after which the means and methods of overcoming them can be investigated. Three different types of comparative analysis are possible.

Synchronic analysis between different political entities

Here, differences in political, social and economic organization manifest themselves in the type and height of the obstacles which will emerge during the armament dynamic. For instance, in a democracy greater energy must be invested in convincing parliamentary and extra-parliamentary opposition of the utility of the armament programme than in a dictatorship. A country with limited industrial development will have to seek greater help from abroad. Such comparisons will consequently reveal a series of thresholds, as well as their relative importance in function of the type of state structure, the material base and the political and military responses.

Diachronic analysis of analogous armament programmes in a single political entity

This comparative method will not only reveal differences in the development of the political and military organization of the country, but will also draw attention to the development of the material base (industry, technology, education, and so on) and its impact on historically comparable issues in the armament process.

Integration of the synchronic and diachronic approaches

This method enables the projection of a current armament programme in a developing country onto the history line of an industrialized state. Intersection occurs at some point on that history line. It represents the earlier stage of development of the industrialized state matching that of the developing country today. The comparison pertains to the material base of these countries, and thus highlights some major difficulties which the developing country would encounter when pursuing a particular capability. This third method lies at the heart of proliferation research.

The proliferation issue can be introduced into the assimilation model because, irrespective of time or place, an armament dynamic always faces thresholds which must be overcome one way or another if the proposed weaponry is to achieve operational deployment. The political culture, the security requirements and the composition of the material base of the proliferator define the characteristics of the barriers, and consequently the size of the opportunity costs to overcome them. Following the initial political decision to acquire a particular type of weaponry, the proliferator may encounter an important hurdle in its material base which cannot be solved by a mere decision on either the political or military track. This threshold therefore affects development on both tracks.

Elements, alone or in combination, that may play a role in defining the height of the threshold in the proliferating state are the scarcity of certain natural resources, lack of technical skills, insufficiently advanced education, an insufficient research and development or industrial base, and so on. Barring abandonment of the entire project, the political leadership has two basic options: either to develop the missing ingredients indigenously, or to seek them abroad. It may, of course, also opt for a combination of both. However, given the probable time frame within which the armament dynamic must be realized, importing the missing elements may be the only feasible and, in the short run, the cheapest option available. Especially if the dearth occurs in the physical base of the political entity, importation may be the only option. In other words, the decision and subsequent actions to seek certain ingredients abroad is but one way of structuring the armament dynamic of the political entity.

The hurdle to be surmounted because of the insufficiency in the material base is particularly high for a developing country seeking a chemical weapons capability, and important opportunity costs to overcome it may be envisaged. The size of these costs, however, will depend primarily on the extent of the preconditions for CBW armament that are already present in the political entity. The government, for instance, will have to consider the enormous financial implications a CBW project entails, as the economy of

the country must be able to support the programme. As a consequence of the secrecy usually surrounding CBW programmes, and because of the requirement not to be distracted from the goal in spite of the many thresholds to be crossed, the government cannot count on economic offsets such as foreign direct investments in the domestic economy or technology transfers.

In addition, it is far from certain that embarking on a CW armament programme will enhance the security of the state. There may be significant international repercussions, especially if the importation of CBW-related materials affects the external security of other countries or if the dealings are undeniably illegal or contrary to international norms. Furthermore, the political entity makes itself dependent on foreign suppliers, and such sources can be shut off, affecting the overall security posture of the state.

The assimilation model can be used to study proliferation from the demand side. This follows from the presentation of proliferation as an armament dynamic within the proliferating state, rather than as a lateral diffusion of weapons technology from possessor to non-possessor states. Irrespective of the characteristics of the political entity, in the effort to assimilate chemical or biological weapons in mainstream military doctrine, the promoters of the armament dynamic will aim to keep the aggregate of opportunity costs as low as possible. Different times and places will generate similar hurdles, the height of which, however, may differ from political entity to political entity, or depend on the period under consideration. These differences lead to varying opportunity costs being paid to overcome the thresholds. The sum of these varying opportunity costs accounts for the potentially different outcomes of the dynamic in the countries under consideration.

Based on the premise that modern chemical warfare is an expression of a level of industrial and technological development comparable to that of the second industrial revolution, a current CW armament programme can be projected onto the history line of a Western industrialized state which once had such programmes. Political entities that have not yet achieved such a level of development are highly unlikely to have acquired a modern chemical weapons capability. Political entities that have surpassed this level of development tend to abandon an offensive chemical warfare posture, or display little interest if no such programmes had been active before. Other more advanced weapons can perform the same missions at least as efficiently, but do not entail the many objections to chemical warfare agents. Less information is available about biological weapon programmes, but at present no data suggest that the analytical framework is not applicable.²³

The movement of chemical and biological warfare from the fringe towards the centre of mainstream military doctrine as part of the assimilation process will depend on how the political entity perceives and addresses its security deficit. An important variable in this respect is security dependency:

the degree to which a political entity is prepared to relinquish sovereignty over its security posture to another more powerful state. Reliance on a powerful custodian appears to function as a strong disincentive to offensive CBW programmes. In contrast, states seeking to maintain absolute sovereignty over their security posture perceive a greater utility for chemical or biological weapons. However, this is far from an absolute conclusion: the perceived utility of chemical or biological weapons diminishes fairly rapidly once alternative technologies materialize which can perform the same functions at least as efficiently, or which are more readily assimilated into mainstream military doctrine. Chemical and biological weapons have consequently always experienced great difficulty in maintaining a position close to mainstream military doctrine.

CONCLUSIONS

Chemical or biological weapons proliferation is far from the easy, automatic process which it is often depicted to be. From the demand-side perspective, the CBW armament dynamics in an industrialized society do not differ fundamentally from those in a developing country. The promoters will seek to structure the dynamic in such a way that the variance between the original plan and the final outcome remains as small as possible. They will consequently have to overcome thresholds whose nature and size depend on the social-political-economic fabric of the political entity involved.

Regarding proliferation, attention is specifically drawn to the material base of the proliferator. Important deficiencies in the material base may require the decision-makers to seek solutions from abroad: importation of certain commodities may be the fastest if not the cheapest way of structuring the domestic armament dynamic. While a certain level of technological, scientific and industrial development is a prerequisite for any political entity embarking on a domestic chemical or biological warfare armament project, importation – not the presence of the programme – testifies to the fact that the proliferator has not or cannot achieve a developmental stage present in the industrialized countries when they maintained similar programmes. In other words, the level of development of the proliferator may be expected to be lower than that of a Western industrialized country when it pursued the same generation of chemical or biological weapons for the first time. However, the proliferator today has the historical example and the knowledge about the properties of the agents and available production methods, so it need not research new agents; it can procure off-the-shelf technology to set up its own production base. In other words, it is able to choose its own time to commence a CW armament programme, and may decide to acquire an

offensive CBW capability at a level of economic development lower than that of the most advanced belligerents in the First World War.

Taken together, these considerations suggest that the comparatively lower state of development at which chemical or biological weapon armament dynamics are activated may in fact be a standard feature among today's proliferators. The pursuit of such capabilities can thus be viewed as an expression of the limitations in the economic and industrial base of the political entity, which explains why such an armament dynamic still poses a formidable challenge. The aspirations can none the less be fulfilled because these limitations may be overcome through the importation of knowledge and technology widely available in the global markets. The fundamental dissatisfaction of these states with their geopolitical environment and resultant expectation of war will lead them to adopt an economic policy that ensures the greatest possible degree of self-reliance and self-sufficiency. These states may thus have acquired several of the strategic industries necessary to sustain modern armed forces. The move towards a chemical or biological warfare capability may consequently fit into the long-term geopolitical and industrialization strategies of these countries. However, if the level of development in the material base is indeed a key determinant in the structuring of the chemical or biological weapon armament dynamic, then related constraints may be expected to operate in other areas of armament as well. Indeed, the six countries systematically associated with CBW programmes in Table 10.1 also display a remarkably high import-dependence for military hardware. They accounted for over 72 per cent of imports of major weapon systems in the Middle East between 1971 and 1990,²⁴ again demonstrating the failure to achieve or impossibility of achieving self-sufficiency in security matters. This increases the perceived security deficit, and strengthens the potential motivation to acquire non-conventional weapons to offset that security deficit.

ACKNOWLEDGEMENTS

Research for this paper was supported by a grant from the US Institute of Peace, Project USIP-027-97F 'Promoting Biological Weapons Disarmament'. The findings in this chapter are those of the author, and do not necessarily reflect the views of SIPRI or the US Institute of Peace.

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- 2 See, for example, the statement of William H. Webster, Director Central Intelligence Agency, before the Committee on Governmental Affairs, US Senate, 'Hearings on global spread of chemical and biological weapons: Assessing challenges and responses', 9 February 1989; statement of William F. Burns (Maj.-Gen. Ret.), Director US Arms Control and Disarmament Agency, to the Senate Governmental Affairs Committee, 10 February 1989; B. Roberts, oral statement to the Hearings on Chemical Weapons of the Senate Governmental Affairs Committee and the Permanent Subcommittee on Investigations, 10 February 1989. See also K.C. Bailey, *Doomsday Weapons in the Hands of Many: The Arms Control Challenge of the '90s* (Urbana and Chicago, IL: University of Illinois Press, 1990), p.58.
- 3 R.O. Spertzel, R.W. Wannemacher, C.D. Linden, D.R. Franz and W. Parker, *Global Proliferation: Dynamics, Acquisition Strategies, and Responses, Volume IV: Biological Weapons Proliferation*, Defense Nuclear Agency Technical Report No. DNA-TR-93-129-V4 (Alexandria, VA: Defense Nuclear Agency, December 1994), p.vi.
- 4 Counterproliferation Program Review Committee, *Counterproliferation: Chemical Biological Defense*, CPRC Annual Report to Congress (1997), Chapter 3, available at: <<http://www.acq.osd.mil/cp/cprc97.htm>>.
- 5 US Department of Defense, *Proliferation: Threat and Response* (Washington, DC: Department of Defense, November 1997), available at: <<http://www.defenslink.mil/pubs/prolif97/>>. As of 12 March 1998, it listed the following countries as having a chemical weapons programme: China, India, Iran, Iraq, North Korea, Libya, Pakistan, Russia and Syria. The countries which it listed as having a biological weapons programme are China, India, Iran, Iraq, North Korea, Pakistan and Russia. Libya was said to lack the scientific and technical base for a BW programme; Syria was said to possess the biotechnical infrastructure to support a BW programme. The absent countries were, notably, Egypt, Israel, South Korea and Taiwan, which were listed in the Office of Technology Assessment, *Proliferation of Weapons of Mass Destruction: Assessing the Risks*, OTA-ISC-559 (Washington, DC: US Government Printing Office, August 1993), pp.65–6. South Korea has meanwhile declared a CW production facility under the Chemical Weapons Convention; J.P. Zanders and J. Hart, 'Chemical and biological weapon developments and arms control', *SIPRI Yearbook 1998*, p.461.
- 6 India, the world's most populous democracy, was the first state to openly cross the nuclear weapon threshold since the entry into force of the 1968 Nuclear Non-Proliferation Treaty when it detonated five devices in May 1998. The US intelligence failure may in part be due to underlying assumptions about the behaviour of democracies.
- 7 The first industrial revolution took place in the middle of the nineteenth century, and was essentially characterized by the extensive mechanization of production processes in factories. In the second industrial revolution towards the end of the nineteenth century, discoveries in organic chemistry played a major role. Since the 1970s, a third industrial revolution is under way, driven by advancements in bio-technologies, electronics, information technologies, miniaturization, semiconductors, and so on.
- 8 J.P. Zanders, 'Towards understanding chemical warfare weapons proliferation', *Contemporary Security Policy*, Vol. 16, No. 1 (April 1995), pp.89–97.
- 9 Proliferation assessments of individual countries may have changed by the time of

- publication. Several countries under consideration have meanwhile joined the Chemical Weapons Convention, and thus taken up the obligations to make full declarations about CW programmes and to allow international inspectors to visit facilities on their territory.
- 10 Testimony by Rear-Admiral Thomas Brooks, Director of Naval Intelligence, before the House Armed Services Committee in May 1991, as reported in Z.S. Davis, S.R. Bowman and R.D. Shuey, *The Proliferation of Nuclear, Chemical, and Biological Weapons and Missiles* (Washington, DC: Congressional Research Service, Library of Congress, 8 April 1992), p.11. In April 1989, the *Chicago Tribune* claimed that Saudi Arabia was one of the countries with access to the necessary resources for the manufacture of chemical weapons, but this report was immediately strongly denied by the Saudi authorities: 'SPA: Source denies chemical weapons charge', *SPA* (Riyadh), 6 April 1989 (in Arabic), Foreign Broadcast Information Service, *Daily Report – Near East and South Asia (FBIS-NES)*, FBIS-NES-89-066, 7 April 1989, p.19.
 - 11 B. Roberts, *Weapons Proliferation and World Order* (The Hague: Kluwer Law International, 1996); p.114; E.M. Spiers, *Chemical and Biological Weapons: A Study of Proliferation* (Basingstoke: Macmillan, 1994), p.42. After Iraq admitted to possessing chemical weapons in 1988, President Saddam Hussein did refer to Iraq's so-called 'binary' chemical weapons as proof of the country's mastery of high technology to enhance the international standing of the regime and its survival in his speech of 1 April 1990, when he threatened to make fire eat up half of Israel. For discussion of the meaning of the speech, see J.P. Zanders, 'The chemical threat in Iraq's motives for the Kuwait invasion', in J.P. Zanders (ed.), *The 2nd Gulf War and the CBW Threat: Proceedings of the 3rd Annual Conference on Chemical Warfare* (Brussels: Interfacultair Overlegorgaan voor Vredesonderzoek, Vrije Universiteit Brussel, November 1995), pp.38–40. Through opaque communication – force posture, deployment patterns, refusal to sign the Chemical Weapons Convention and silence over international accusations of proliferation – Syria also signals its possible possession of chemical weapons.
 - 12 Spiers, *Chemical and Biological Weapons*, p.42.
 - 13 Comparisons have been calculated based on data in International Institute for Strategic Studies, *The Military Balance 1993–1994* (London: Brassey's, 1993).
 - 14 The Gulf Co-operation Council comprises six states on the Arabian Peninsula: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.
 - 15 In 1985, the GCC had a total of 137,800 troops under arms, compared with Iraq's 600,000 (excluding 425,000 personnel of the Popular Army) and Iran's 600,000 regular troops and Pasdaran (excluding several million paramilitaries). By the end of the war, Iran and Iraq's armed forces totalled 650,500 and 1,000,000 respectively, while the GCC countries had increased their armed forces to a total of 160,950. International Institute for Strategic Studies, *The Military Balance 1985–1986* (London: IISS, 1985) and *The Military Balance 1988–1989* (London: IISS, 1988).
 - 16 In private discussions at the University of Kuwait in April 1994, all academics firmly rejected the CBW option to deter future aggression by Iraq or another Gulf power, but some wished for a nuclear capability, referring to the stability it introduced in European security relations.
 - 17 J.P. Zanders and J. Hart, 'Chemical and biological weapon developments and arms control', *SIPRI Yearbook 1998: Armaments, Disarmament and International Security* (Oxford: Oxford University Press, 1998), pp.460–1.
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- 19 United Kingdom of Great Britain and Northern Ireland, 'Declaration of past activities relating to its former offensive chemical weapons programme', via the British Embassy, Stockholm, May 1997, p.2.
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- 21 J.P. Zanders, *Dynamics of Chemical Armament: Towards a Theory of Proliferation*, PhD Thesis in Political Science (Brussels: Vrije Universiteit Brussel, February 1996).
- 22 The armament dynamic embraces complex decision-making mechanisms in which numerous actors, positively influenced or constrained by environmental factors, participate. The arms acquisition process is thus the outcome of an aggregate of relevant individual decisions taken within a specified time frame. See Zanders, *Dynamics of Chemical Armament*, p.66.
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Technology Transfer

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Ashgate

Aldershot • Burlington USA • Singapore • Sydney

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Published by
Ashgate Publishing Limited
Gower House
Croft Road
Aldershot
Hants GU11 3HR
England

Ashgate Publishing Company
131 Main Street
Burlington
VT 05401
USA

British Library Cataloguing in Publication Data

Technology transfer

1. Technology transfer – Congresses

I. Schroeer, Dietrich II. Elena, Mirco III. International

School on Disarmament and Research on Conflicts

338.9'26

Library of Congress Cataloging-in Publication Data

Technology transfer / edited by Dietrich Schroeer and Mirco Elena.

p. cm.

ISBN 0-7546-2045-X

1. Technology transfer. I. Schroeer, Dietrich. II. Elena, Mirco.

T174.3.T37568 2000
338.9'26—dc21

99-049273

ISBN 0 7546 2045 X

Typeset by Manton Typesetters, Louth, Lincolnshire, UK.
Printed in Great Britain by Antony Rowe Ltd, Chippenham, Wiltshire.