6. Military R&D: Economic and Employment Issues

Although the main motivation for military funding of R&D is to develop new technologies for defence and offence, as with other military spending, its supporters also argue that it provides major benefits in terms of economic development, employment, and 'spin-off' technologies for civilian use. In this chapter, we briefly assess these claims, and then look at the potential economic and employment effects of a move towards the funding of R&D where sustainable security perspectives play a greater role.

6.1 Contributing to technological development and the economy

Historically, the military has had a major influence on the direction of technological development. Especially during World War II and the Cold War, the military dominated public funding of R&D in countries such as the USA and the UK (see chapter three). Consequently, a number of civilian technologies, such as the jet engine, nuclear power plants and communications satellites, have their roots in R&D originally undertaken for military purposes (Budd and Gummett, 2002; Hambling, 2005). This has led to claims that military funding of R&D should remain high partly because of the benefits of such 'spin-off' or 'spin-out' to the civilian economy.

However, such a view is highly questionable on numerous grounds (Langley, 2005; Dunne and Coulomb, 2008; Dunne and Braddon, 2008).

Firstly, the development stages from a military technology to a civilian one can often be complex and expensive (Langley, 2005). Military technologies are developed for specific roles relevant to the battlefield, and conversion to civilian uses may require significant extra investment that offers little economic advantage over civilian innovation pathways. Indeed, hopes that large numbers of products based on the R&D of arms companies would flow into the civilian sector in the aftermath of the Cold War have, in general, proven unfounded.

A related obstacle to successful spin-out is the need for safeguards to be sometimes put in place to prevent the spread of the new civilian technical knowledge leading to the proliferation of the original military technology. This issue has been a serious problem, for example, in the case of civilian nuclear power and the risks it creates for the proliferation of nuclear weapons (see appendix A5).

It is also notable that, where once the military and aerospace sector was a leader in R&D spending, it is now no longer the most research intensive, with the pharmaceutical, biotechnology, health, IT hardware and electrical and electronic sectors investing more (Dunne and Braddon, 2008). Indeed, civilian to military 'spin-in' has become important – especially in information technology – as funding for civilian R&D has grown (Langley, 2005).

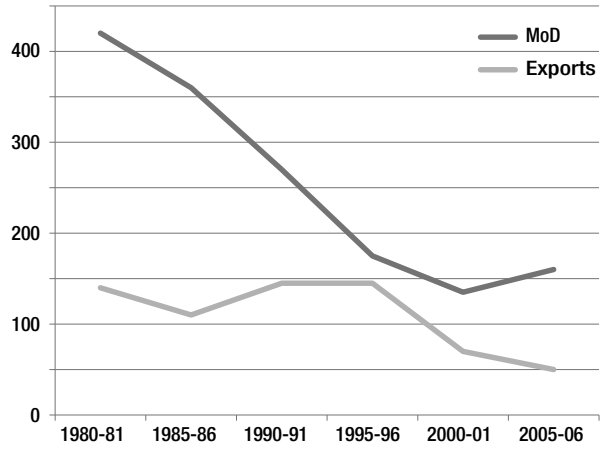
Defining the economic benefit from R&D can sometimes prove problematic as R&D is an input rather than an output in the economic system. However, detailed analysis of the military-industrial sector has revealed systemic shortcomings which question whether military R&D has any net economic benefits (Dunne and Coulomb, 2008). The close relationship between government and arms companies – and the secrecy surrounding such relationships – can lead to inefficiencies and high costs. Funding for civilian R&D can be crowded out, with the military gaining preferential access to skills and technical resources. As such, there can be a high 'opportunity cost' for prioritising military R&D. Overall, the evidence points to the conclusion that military R&D has not been an important factor for economic growth, with military spending as a whole having either a neutral or negative impact on industrialised economies (Dunne and Braddon, 2008). Indeed, some of the most successful high-technology economies, such as Germany and Japan, have markedly lower public funding of military R&D than the UK (see chapter three).

6.2 Contributing to employment

UK employment in military production, in the arms industry, has fallen dramatically in the past few decades, as shown in Figure 6.1. This has partly been due to the 'peace dividend' as the Cold War ended and the UK reduced its military spending. The fall is also related to the increasingly capital intensive nature of the arms industry, which provides relatively few jobs for the capital invested. Another factor is the internationalisation of various UK-based arms corporations. Today, companies such as BAE Systems, which evolved from the nationalised British Aerospace, has more workers in the USA than in the UK (CAAT, 2009).

Looking at UK employment related to military R&D in particular, this has also fallen and now makes up a relatively small proportion of those working in science and technology. For

Figure 6.1. UK employment from military equipment production (in thousands) (DASA, 2008)



Notes

Figures include both direct and indirect jobs.

In 2006-07 (the latest year from which figures are available), jobs resulting from MoD funding fell slightly to 155,000 and jobs resulting from arms exports rose slightly to 55,000.

example, the latest figures show (Table 6.1) that around 16,000 people are employed in UK businesses as a result of military R&D spending. This is only about 10% of the total employed in all R&D in this sector.

The major shifts in employment over the past few decades have occurred without long lasting negative economic effects such as increased unemployment. In fact, such shifts mirror the demobilisation and industrial conversion at the end of World War II, albeit on a smaller scale.

Employment is used as an argument for subsidising the arms industry and the R&D it carries out. We critically examine this issue further in appendix A7.

Table 6.1. Employment in civilian and military R&D performed in UK businesses, 2011 (full time equivalent in thousands: all figures are rounded) (Office for National Statistics, 2012)

	Civilian	Military
Scientist and engineers	80	9
Technicians, laboratory assistants & draughtsmen	38	4
Administrative, clerical industrial & other staff	25	2
Total	**143**	**16**

6.3 The potential for further arms conversion

Given the limited economic and employment benefits of military R&D, what would be the effects of a further stage of 'arms conversion' due to a shift in the UK's security strategy?

In the UK, thought has already been given to the economic impacts of spending cuts on military equipment and the consequent loss of arms production jobs. A report co-authored by MoD economists calculated that were arms exports to halve, over 30% more jobs would in fact be generated over the following five years due to the high technology skills of arms industry workers being redeployed elsewhere in civilian industry (Chalmers et al, 2001). A further study, published by the British American Security Information Council (BASIC), analysed the economic effects of the cancellation of the replacement of the Trident nuclear weapons system and the two new aircraft carriers (Dunne et al, 2007). If government spending on either of these systems were redirected into the civilian economy, the report concluded that at least 50% more jobs would be created after the economy adjusts.

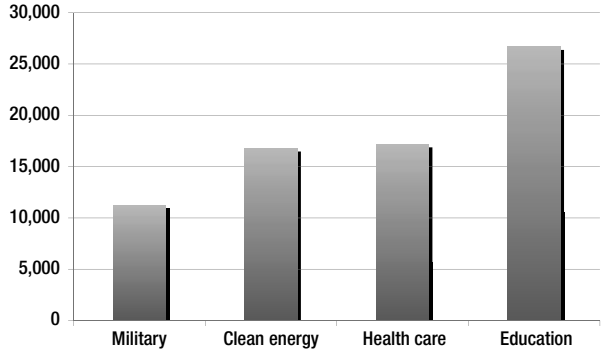
Such analysis is borne out by research from the University of Massachusetts (Pollin and Garrett-Peltier, 2011). This study concluded that if the US government invested $1 billion in alternative civilian sectors, rather than on military production, it would generate up to 140% more jobs – see Figure 6.2. The civilian sectors it looked at included clean energy, healthcare, and education, and it considered direct, indirect and induced jobs in each case.

There is, in fact, a substantial amount of academic research available on the practicalities of arms conversion, using a variety of analytical methods (Schofield, 2007). As spending is shifted over a number of years – for example, by major cuts in the UK's offensive weapons capability and a move to a non-offensive defence strategy – jobs are created elsewhere in the economy. Only a small number of local economies, especially dependent on arms production, would be caused significant disruption. However, even this could be remediated by concerted efforts in retraining or regeneration programmes.

Direct evidence that skills from the military industrial sector are being successfully redeployed in the civilian sector comes from testimony by both policy-makers and industry. For example, in February 2012, local MP David Rutley said: "It's a difficult climate out there, [but] there's a skill shortage in the UK, and if you take the example of the big closure in BAE Woodford, within a year most people had found jobs because of the skills they had" (BBC News, 2012).

Another telling quote comes from the President of General Dynamics UK (also Vice President-Defence of the arms industry's trade association) who, while attempting to argue in favour of

Figure 6.2. Jobs created by $1 billion spending by the US government by sector for US, 2009. Figures include direct and indirect jobs. (Pollin and Garrett-Peltier, 2011)



higher arms spending in 2010, told the parliamentary Defence Committee that: "... the skills that might be divested of a reducing defence industry do not just sit there waiting to come back. They will be mopped up by other industries that need such skills. We are talking about high-level systems engineering skills, which are often described as hen's teeth. It is an area in which the country generally needs to invest more. You can think of the upsurge in nuclear and alternative energy as being two areas that would mop up those people almost immediately" (Hansard, 2010).

The general view that there is a high demand for the skills present in the arms industry can also be deduced from government statements which recently acknowledged that "At present the demand for skilled engineers far exceeds supply" (BIS, 2011).

Against a background of moving towards a sustainable security strategy, industrial sectors that would be especially valuable are low carbon energy and some other environmental industries. In 2010, the government commissioned an assessment of the level of UK employment in the 'low carbon and environmental goods and services' (LCEGS) sector (Innovas, 2010). This concluded that approximately 910,000 direct and indirect jobs were present – more than four times the level in the military industrial sector. Indeed, the report pointed out that the LCEGS sector was rapidly expanding sector – which is in stark contrast to military industry in the UK. However, some caution is needed with these job estimates. The LCEGS sector is new and definitions of exactly which companies and job specifications should be counted are still contested.

Nevertheless, one sector that is more clearly defined is the renewable energy sector. The most recent estimate for UK employment in this sector (both direct and indirect) is 110,000 jobs (Innovas, 2012) – an important contribution from a relatively new industry that is essential in tackling the global security threat of climate change.

Hence, arms conversion and renewable energy and energy efficiency work could be linked. The skills used by both are reasonably similar and indeed studies have been undertaken that show the potential for redeployment of workers from arms production to renewable energy. For example, a US study (Pemberton, 2009) examined the crossover potential between a naval shipyard, manufacture of the advanced F-22 fighter, C-130J transport aircraft and expeditionary fighting vehicles and a range of 'green' technologies. The report concluded that nearly every position had an equivalent position that an arms industry worker could be retrained to fill.

Indeed, there is a growing recognition of opportunities in renewable energy within the UK military industry itself. Barry Warburton, the CEO of the West of England Aerospace Forum, said of the MoD budget cuts, "This is a perfect opportunity for diversification and renewable energy presents a massive new market" (Insider, 2010). He added "A turbine blade is not dissimilar to a helicopter blade. It's electrical and mechanical engineering."

In conclusion, there is a great deal of evidence that points to the positive economic and employment benefits of a shift away from a security strategy based on a high reliance on offensive weapons systems towards one that has sustainable security at its heart.