The Next Grand Fleet: A Resource-Constrained Perspective on Naval Acquisition Challenges

by **Dr Jeffrey Bradford**

Dr Bradford is Manager, Group Business Development at Babcock International Group and was formerly a consultant with Arthur D. Little, specialising in corporate strategy within the aerospace and defence sector. In this article, he looks at the continuing decline in fleet size and considers the most important questions that have to be answered.

The naval shipbuilding portion of the defence industrial base has come to the fore in recent years as nations across Europe and North America embark upon major programmes to update the capabilities of their navies. However, the military customer is faced with the challenge of an industrial capability weakened by uneven orders and/or defence budget reductions, leading to a negative spiral where industrial entities are reluctant to prioritise investment in skills and capabilities over more profitable segments such as aerospace.[1]

This article aims to assess the challenges around force structure, vessel acquisition and operating costs from a historical perspective, and aims to understand where the most sensitive trade-offs in force structure are (or indeed need) to be taken.

Trends in Fleet Size and Budget

Pugh (1986) proposed a hypothesis based on research from the mid-1950s through to the early 1980s concerning cost escalation and its impact on the Royal Navy.[2] Over the period encompassing the post-World War Two years, the withdrawal from East of Suez through to the Falklands conflict, Pugh charted the reduction in numerical strength of major Royal Navy (RN) platforms against defence budgets and rising unit costs of equipment.

His assessment in the mid-1980s was that modern navies faced with constant budget pressures were choosing to respond by one of three methods: reducing the size of the fleet; stretching the service life of platforms; or fundamentally reconsidering the concepts, force structure and equipment plan underpinning the service.

Reducing the Size of the Fleet

The 1955–1983 Royal Navy dataset identified that, whilst unit costs of equipment had increased by 9%, defence budgets had only grown by 2% creating a 7% shortfall in funding. Pugh's arithmetic suggested that to match budget to costs would require a 3.5% annual decrease in the size of fleet – analysis of the Royal Navy in this time period indicated it had contracted on average by 2.5% per annum.

Extending Pugh's dataset by some two decades enhances the picture painted for us and offers some additional insights (see Figure 1 below).

Figure 1: Royal Navy active fleet: submarines, frigates and larger vessels (1948/49–2004/5)[3]

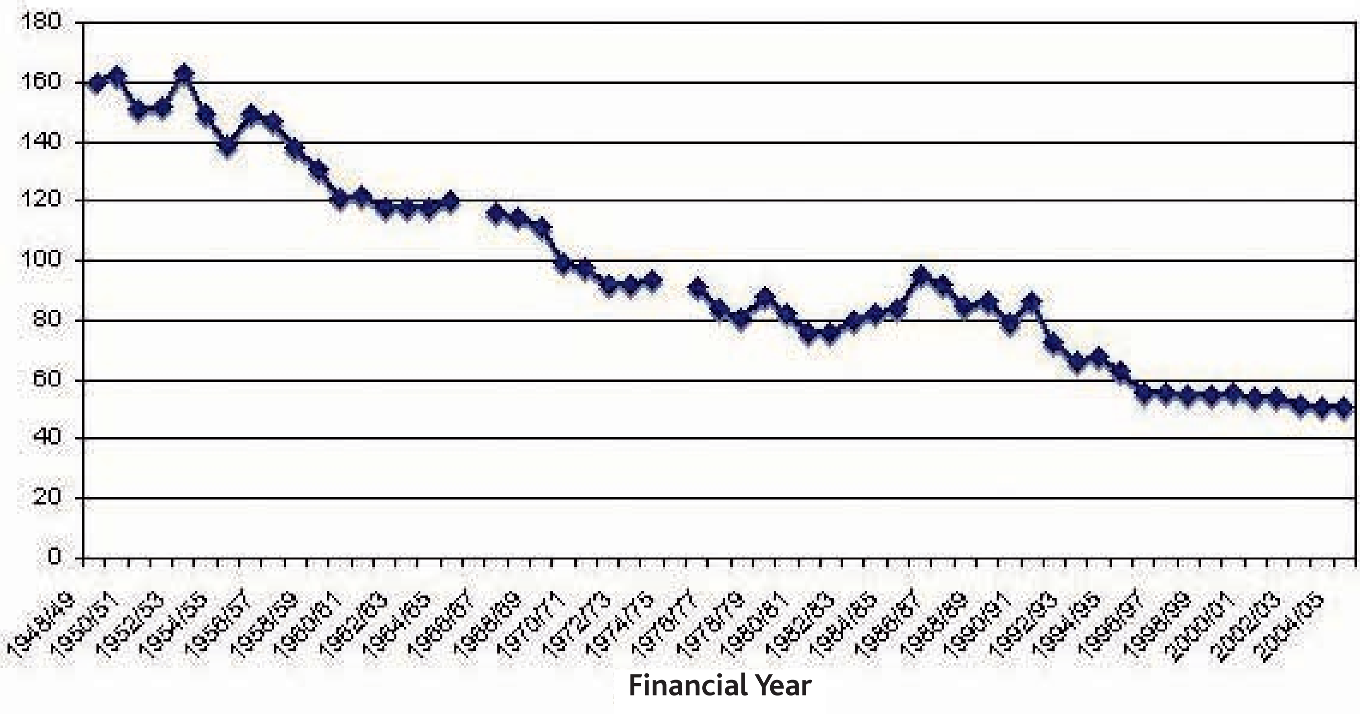


Figure 2: Average cost per platform of major RN Warship Classes[6]

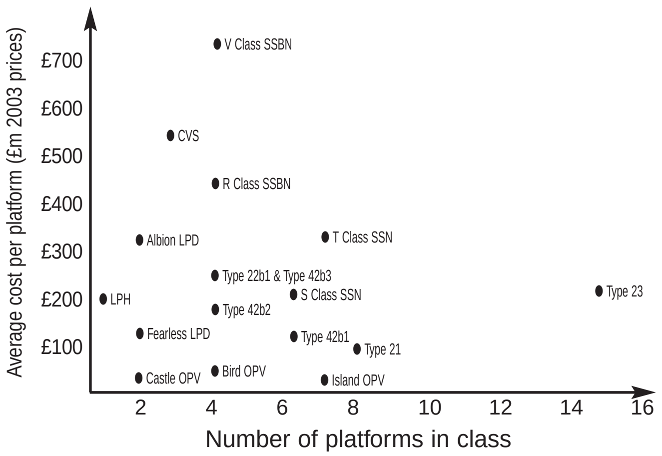
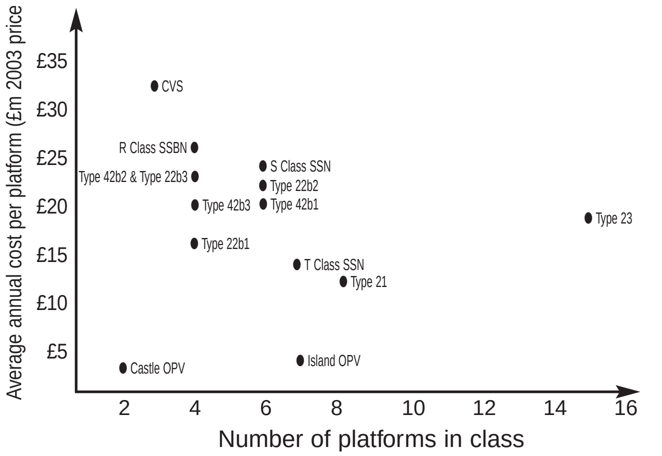


Figure 3: Average Annual Cost per Platform of Major RN Warship Classes[7]



Considering an enhanced dataset covering the period since World War Two suggests a trend of gradual decline from the late 1940s which appears to have reached a near 'steady state' after the reductions following the end of the Cold War. The mid-to-late 1980s' data, which bucks this trend, could relate to a post-Falklands War surge in shipbuilding, especially the introduction of the Type-23 'Duke class' frigate to the Fleet.

The absolute change across the period charted above is a little under 70% in reduction in platform numbers – which compares well with Pugh's postulation of a 2.5% decline per annum (which would have translated into a 75% reduction in the same period). The average percentage annual reduction in the total number of platforms is 1.25% per year.

The positive trend identified across a much longer time frame is the relatively slower rate of reduction in RN platforms over the past several years.

Shaping the Future Naval Force Structure

When looking at naval capability in crude terms, it would appear that naval force generation is increasingly focused on fewer, but larger, successor platforms to existing equipment as the favoured way forward. Table 1 below offers a few comparisons in support of this hypothesis.

Even with the forecast reductions in whole-life cost and crew numbers, do fewer platforms translate into less cost? Although disclosure of the cost of producing each unit in a class of vessels was classified in the late 1980s, it is possible to build a basic picture indicating the costs by class and converting the costs to uniform 2003 prices (see Figure 2 above).[5]

The above representation of cost data suggests that subsequent generations of equipment experience significant cost escalation despite often being procured in similar numbers (for example in the case of the LPD and SSBN classes). Surprisingly, the data suggests that there is obvious benefit to be derived from longer production runs in terms of average unit costs between types of vessel (e.g. Type 42 batches). However, this analysis excludes the impact on the defence industrial base of sporadic ordering, which has led to the concerns reflected in the introduction in the US and UK.

Having looked at production costs and identified a clear trend towards fewer, larger vessels in each subsequent generation – from the point of view of stretching the lifespan of platforms – some measure of through-life costs requires consideration. Figure 3 above outlines annual average running costs for a variety of platforms. Once again, these running costs have been converted into uniform 2003 prices.

The above graphic, although lacking in data for some of the newer classes of vessel, suggests the reduction in operating costs that will be gained with newer classes of vessel. These would be derived from the 'virtuous circle' of applying newer systems and technologies, which in turn reduce crew requirements.

Fundamental Reconsideration of Concepts, Force Structure and Equipment Plan

The adoption of submarines by Germany in World War Two, and small craft with surface skimming missiles in the early 1970s, can be seen as ways by which navies will try to change the rules to turn the weaknesses in their own force structure into strengths.

Looking at the naval programme in UK,

Table 1: Generational Growth in Platform Size[4]

Class	Displacement	Class	Displacement	Class	Displacement
Type 21 Frigate	3300 tonnes	Type 42 Destroyer	5200 tonnes	Trafalgar SSN	5200 tonnes (dived)
Type 22 Frigate	5300 tonnes (+60%)	Type 45 Destroyer	7350 tonnes (+40%)	Astute SSN	7800 tonnes (dived) (+50%)
Class	**Displacement**	**Class**	**Displacement**	**Class**	**Displacement**
Fearless LPD	11,582 tonnes	Island Class OPV	1260 tonnes	Resolution SSBN	8500 tonnes (dived)
Albion LPD	18,500 tonnes (+60%)	River Class OPV	1677 tonnes (+33%)	Vanguard SSBN	15,980 tonnes (dived) (+90%)

and having considered the background costs and changes in fleet size, what questions could be suggested as being the right ones to ask?

- With the shift in accounting techniques to enhance effective understanding and management of scarce resources, what capabilities does the Royal Navy actually need to own? What platforms and capabilities can it afford to lease (beyond the River Class OPV example)? Is it feasible to envision a scenario where only the significant surface combatants are owned by the Royal Navy?

- Are fewer, larger vessels run for longer better than many, smaller vessels run for shorter lifespans? The latter would enable better and quicker penetration of modern technologies, and would enable faster adaptation to lessons learned from operations.

- In terms of managing whole-life costs more effectively, will it be more logical to push for fewer, more homogenous classes of vessel in future? For the immediate future (through to 2012) a surface fleet based around the Type 45 and upgraded Type 23 frigate seems likely. For the submarine community, will it ultimately be necessary to standardise on one SS(B)N vessel that carries what the USA refer to as 'mini-nuclear weapons' as the next generation deterrent force? ■

NOTES

1. For indicative commentary on the US shipbuilding situation see 'Grim Outlook for Shipbuilding Industrial Base Portends Changes', *Inside the Navy,* Volume 17, No 39, 27 September 2004. Also 'Australian Naval Shipbuilding Moving Forward', Ministry of Defence Australia http://www.defence.gov.au, 27 May 2004. For a UK perspective see 'Naval Orders Signal Sea-change for Shipyards', *The Financial Times*, www.ft.com, 29 October 2004.

2. For more details see Philip Pugh, *The Cost of Sea Power: The Influence of Money on Naval Affairs from 1815 to the Present Day*, Conway Maritime Press, London 1986, Chapter 10, pages 272–295.

3. Sources: Pugh (ibid). Statements on the Defence Estimates (various), Defence Statistics (various), The Defence White Paper (various), *Jane's Fighting Ships* (Jane's Information Group). Note: Financial Years pertain to the UK Government fiscal year (April to April). Number of platforms is the aggregate number of vessels of the types and classes mentioned in service in the particular year. Lastly, there were two years in the period under consideration in which there were no annual publications and therefore no data concerning platform holdings (1965/66 and 1974/75).

4. Data derived from *The Royal Navy Handbook: The Definitive MoD Guide,* Conway Maritime Press, London, 2003. Note: FF = Frigate, DDG = Destroyer (with guided missiles), SSN = Nuclear-powered attack submarine, LPD = Landing Platform Dock, OPV = Offshore Patrol Vessel.

5. See *Hansard,* 23 October 1989, 'Navy Vessels' which cites 14 January 1988 Official Report Column 373 as the source of the classification.

6. This table captures the cost of individual units within the class of vessel where possible (pre-late 1980s) and averages this data. The prices are adjusted to uniform 2003 prices by reference to Table 1. Composite price index 1750 to 2003 in *Economic Trends 604*, Office of National Statistics 2004. Acronyms – SSBN = Nuclear-powered strategic submarine.

7. Sources as per Figure 2. Running cost information from *Hansard*, 30 April 1993, 'Vessels (running costs)' and 18 July 1995, 'Naval vessels (running costs)'. Note: In both instances the data was based on average annual operating costs (personnel, fuel, stores) of each vessel within a class based on previous six years' activities.